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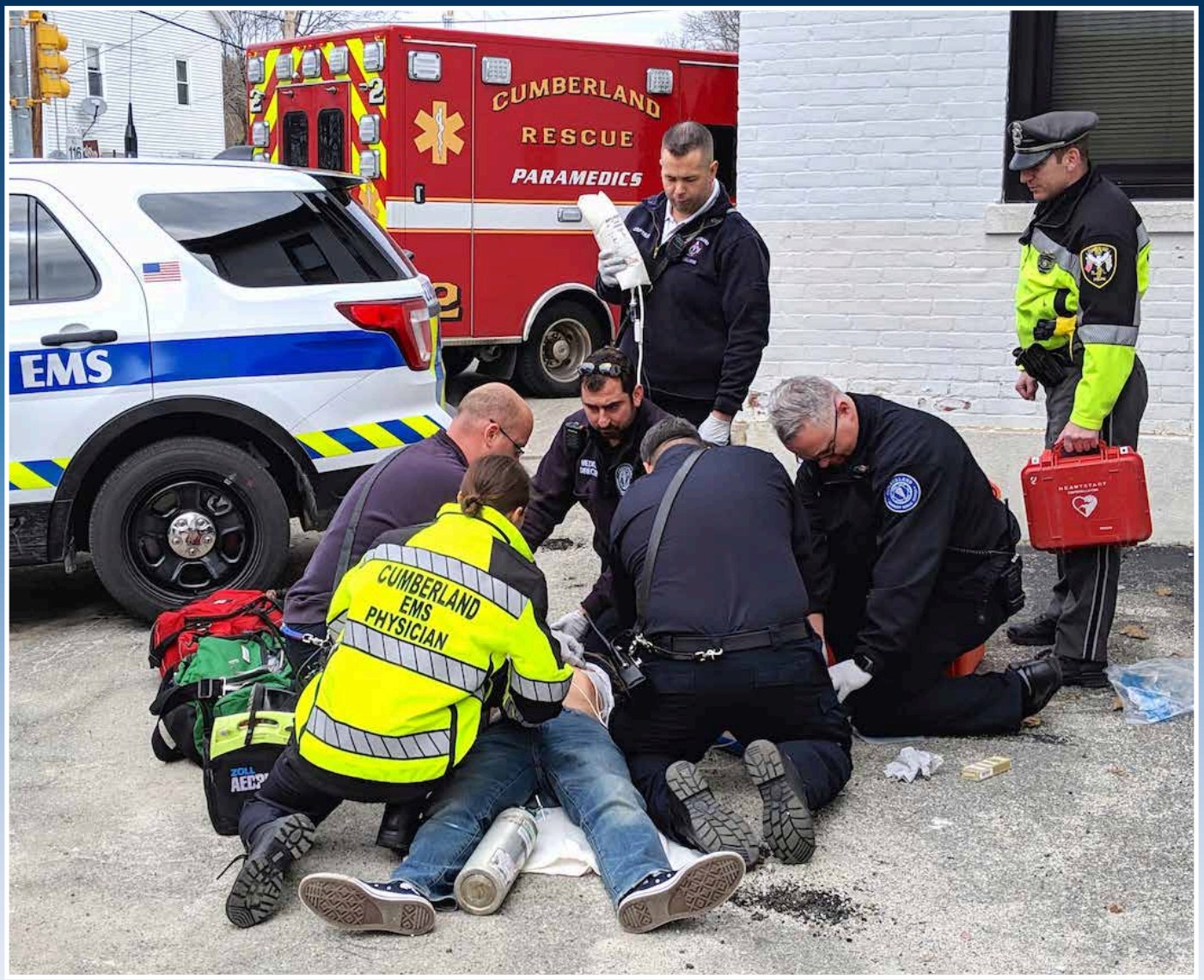

SPECIAL SECTION

OUT-OF-HOSPITAL CARDIAC ARREST (OHCA)

GUEST EDITORS: NICHOLAS ASSELIN, DO, MS; KENNETH WILLIAMS, MD, FACEP, FAEMS

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On the cover: Members of the Cumberland Fire and Police Departments assist Cumberland EMS paramedics and physicians during a simulated out-of-hospital cardiac arrest. [PHOTO: JOHN PLIAKAS]


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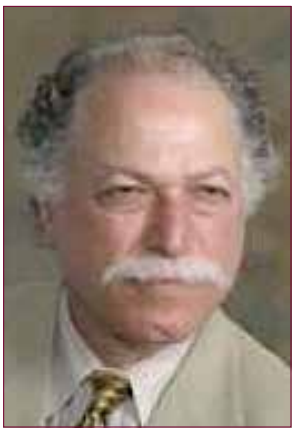
Clinical Practice Guidelines: 'To Treat, or Not to Treat, That is the Question'

KENNETH S. KORR, MD, FACC



Healthcare providers are assailed with a steady flow of "new and improved" clinical practice guidelines (CPGs) designed to impact the quality of patient care but which can be confusing, conflicting, difficult to apply in patient settings and challenging to gain physician acceptance and patient adherence. Nowhere is this more prevalent and complex than in the arena of cardiovascular disease where the combined American College of Cardiology and American Heart Association (ACC/AHA) have 26 current guidelines (averaging 121 recommendations/guideline), including the management of blood pressure (BP) and elevated blood cholesterol, impacting not just cardiologists but internists, family medicine physicians, endocrinologists, pediatricians and other primary care providers.

According to the Institute of Medicine, "Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate healthcare for specific clinical circumstances."[1] Commonly issued by subspecialty organizations like the ACC and the AHA, CPGs define the role of specific diagnostic and treatment modalities and contain recommendations based on a systematic review and synthesis of the published medical literature and an assessment of relative risks and benefits. Guidelines are suggestions, not rules, intended to help clinicians take better care of patients. While they identify and describe generally recommended courses of intervention, they are not presented as a substitute for physician judgement in the treatment of an individual patient.

The rationale behind current CPGs correlates to the increasing difficulty to stay current with the volume of medical literature and the rapidly expanding knowledge bases related to healthcare. The number of randomized controlled trials (RCTs) published in MEDLINE grew from 5,000 per year from 1978–1985 to 25,000 per year from 1994–2001.[2] Furthermore, much of the RCT literature is focused on individual subsets of target populations which may not be reflective of broader clinical settings and thus are difficult to apply in daily practice. As a consequence, critically appraised and synthesized scientific evidence has become a valuable tool of modern clinical practice.

Levels of Evidence (LOEs)

Most CPGs rely heavily on RCTs' results to validate and support their recommendations and employ levels of evidence (LOE) to support particular guideline recommendations. Three well-defined LOEs are commonly utilized in CPGs: LOE A, supported by data from multiple RCTs or a single, large RCT; LOE B, supported by data from observational studies or a single RCT; and LOE C, supported by expert opinion only. Across the 26 current ACC/AHA guidelines, only 8.5% of the recommendations were classified as LOE A, while 50% were LOE B, and 41.5% were LOE C. Thus, among recommendations in major cardiovascular society guidelines, only a small percentage were supported by evidence from multiple RCTs or a single, large RCT.[3] Nevertheless, this represents the best current available evidence from which to base guideline recommendations.

Evolving Guidelines

CPGs are not meant to be static documents and evolve over time as new scientific knowledge is acquired. One of the most striking examples of this comes from review of 50 years of AHA guidelines for the prevention of infective endocarditis (IE).[4] The earliest guidelines were complicated, difficult to remember, ambiguous, and inconsistent. Reflective of the times, they had an overemphasis on antibiotic prophylaxis based predominately on case reports, limited data and expert opinion. Over the course of 50 years, however, the recognition that there were no RCTs demonstrating an increased incidence of IE following dental or other (GI, GU) procedures and more importantly no demonstrable benefit from antibiotic prophylaxis in actually reducing the incidence of IE, have changed the guidelines considerably. Antibiotic prophylaxis is no longer recommended for dental and other procedures, nor for the majority of patients including those with mitral valve prolapse, congenital heart disease or rheumatic valve disease. Current guidelines stress the importance of regular dental hygiene for the majority of the population and limit use of prophylactic

antibiotics to a small subset of patients with the highest risk of adverse outcomes from IE (complex congenital heart disease, prosthetic heart valves and prior IE).

Conflicting Guidelines

Occasionally, differing societal guidelines conflict and while these differences are typically minor, they can lead to substantial confusion for providers. This is most evident in the controversy surrounding recent BP guidelines. In 2017, the ACC/AHA published new guidelines for the management of high blood pressure[5] which contained much valuable information regarding best practices for measuring BP, the relevance of home BP monitoring and the important role of diet and exercise as first-line therapy for hypertension. Perhaps most striking however, the recommendations redefined hypertension as a BP of 130/80 mm Hg or greater. Underpinning this guideline was the belief that achieving this target BP would lower a person's risk of CVD events, including the large group of adults younger than 75 years who are at low to moderate risk of CVD. Nine trials contributed to the ACC/AHA meta-analysis on which the guideline was based. Trials selectively enrolled persons at high risk of cardiovascular disease, with follow-up ranging from 2 to 5.7 years. No statistically significant benefit was found for all-cause mortality, CVD mortality, heart failure, or renal events when the lower BP cutoff was used, and the difference for fatal or nonfatal myocardial infarction was borderline nonsignificant. Only composite major CVD events (6.2% vs. 7.3%; RR = 0.84; number needed to treat = 91) and the combination of fatal and nonfatal stroke (2.4% vs. 2.9%; RR= 0.82; number needed to treat = 200) were significantly decreased when the lower cutoff was used.

The American Academy of Family Practice (AAFP) and the American College of Physicians (ACP) were not involved in the development of these guidelines and based on a review of the scientific merits elected not to endorse them. Instead, these groups continue to follow the 2014 Eighth Joint National Committee (JNC-8) guidelines on managing hypertension in adults,[6] which calls for treatment to lower BP to 150/90 mm Hg in those age 60 and older, and to 140/90 for adults less than 60. In patients with diabetes and chronic kidney disease (CKD), the guidelines recommend initiating drug treatment to a goal of <140/90mmHg. The AAFP and ACP did acknowledge that there might be a small benefit of lower treatment targets in reducing cardiovascular events and recommended treatment for some patients as part of a shared decision-making process.

Cholesterol Management Guidelines and the Risk Calculator

In 2013, the ACC/AHA published Guidelines for the Management of Blood Cholesterol[7] which, among other recommendations, included use of a Pooled Cohort Risk Equation to estimate 10-year risk of ASCVD events and provide a guide for who should receive statin therapy and at what level (low, moderate or high intensity). Commonly referred to as the CV Risk Calculator (RC), it was designed for individuals aged 40–75 years of age, with or without diabetes, with an LDL-C between 70 and 189 mg%, not on statin therapy. It is based upon 8 data elements including age, gender, systolic BP, Total and HDL cholesterol, active treatment of HTN and/or DM and current smoking. Individuals with an estimated 10-year risk of >7.5% were recommended to receive moderate to high intensity statin therapy. The 7.5 % value was deemed to be a moderately elevated risk although earlier risk calculator models defined 10-20% as moderate risk and >20% as high risk. The RC continues to be an important element in the updated 2018 ACC/AHA Cholesterol Management Guidelines as well as in the 2017 ACC/AHA Blood Pressure Guidelines (where a risk level of 10% instead of 7.5% is deemed moderate risk).

Use of the RC has markedly increased the pool of potential individuals who would require therapy and has sparked considerable controversy and debate as to its ability to accurately predict risk. The RC is heavily driven by age and gender such that men 65 and older and women 70 and older almost always fall into a moderate risk category (**Figure 1**). In addition, the RC does not include key information such as history of ASCVD events, family history of premature coronary artery disease or stroke, diet and activity level (healthy lifestyle), BMI and other elements that physicians routinely take

Figure 1. Estimated 10-year ASCVD Risk for a Patient with a BP of 120/75, Total Cholesterol of 150 mg% and HDL-C 55mg%, Not Diabetic, Nonsmoker and Not on Statin Therapy

AGE	Male	Recommendations	Female	Recommendations
50	1.9%	No indication for Statin	0.7%	No indication for Statin
55	3.3%	No indication for Statin	1.3%	No indication for Statin
60	5.5%	No indication for Statin	2.3%	No indication for Statin
65	8.9%	Moderate to High Dose Statin Therapy	4.2%	No indication for Statin
70	13.6%	Moderate to High Dose Statin Therapy	7.7%	Moderate to High Dose Statin Therapy
75	19.9%	Moderate to High Dose Statin Therapy	13.9%	Moderate to High Dose Statin Therapy
79	26.2%	Consider Moderate Dose Statin Therapy	21.9%	Consider Moderate Dose Statin Therapy

*ACC/AHA Pooled Cohort Risk Equation and estimated 10-yr. risk of ASCVD events.

into account when assessing risk and recommending treatment. In 2013, the Kaiser Permanente health group compared the observed risk of ASCVD to the RC predicted risk in a large pool of their patients.[8] Among 307,591 eligible adults without diabetes between 40 and 75 years of age, there were 2,061 ASCVD events during 1,515,142 person-years. The observed 5-year ASCVD risk was substantially lower than the predicted risk, sometimes by as much as 50% lower risk. Thus, in this large, contemporary "real-world" population, the ACC/AHA Pooled Cohort Risk Equation substantially overestimated actual 5-year risk in adults without diabetes, overall and across various sociodemographic subgroups. For patients with DM, the observed and predict risk was more closely correlated.

'To Treat, or Not to Treat'

It is fairly well accepted that patients with hypertension, DM and/or a history of vascular events should be on aspirin, statin and antihypertensive therapy. But when considering primary prevention, the RC can be a source of confusion for clinicians and their otherwise healthy and older (> 65) patients with no or little evidence of significant vascular disease. In our hypothetical patient from **Figure 1** with normal BP and an unremarkable lipid profile, the predicted CV risk for men doubled between the ages of 65 and 75 years and for women it almost doubled every 5 years, all other elements being equal. In the absence of other risk factors we are left in a quandary whether to initiate statin therapy, especially when the patient is reluctant. A recent meta-analysis of all large statin trials (those recruiting at least 1,000 participants with a treatment duration >2 years) evaluated the effects of statin therapy on major vascular events and cause-specific mortality for 6 subdivided age groups: >75 years, 71–75 years, 66–70 years, 61-65 years, 56–60 years, and ≤55 years.[9] Although statin therapy significantly reduced the number of major vascular events regardless of patient age, there was less direct evidence of the benefits of statin therapy for patients >75 years old who did not already show evidence of occlusive vascular disease. Thus, while the evidence supports the use of statin therapy in older people considered to have a sufficiently high risk of occlusive vascular events, "there is less definitive direct evidence of benefit in the primary prevention setting among patients older than 75 years."[9] The importance of shared decision making in informing patients and gaining their acceptance cannot be overstated.

Barriers to Physician and Patient Acceptance of CPG Recommendations

Physician adoption and patient adherence to CPGs can be challenging and numerous barriers exist.[10] There are

The Edwin Smith Papyrus

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Earliest CPG buried for 3,000 years in Egyptian tomb

Clinical practice guidelines (CPGs) are not new and have been around since the beginning of recorded time. The earliest reported medical guidelines, the Edwin Smith Papyrus, written in Egypt c.1600 BC, a surgical treatise, describes in great detail the clinical findings, diagnosis, treatment and prognosis of some 48 different ailments.

The Papyrus was brought to light by Egyptologist Edwin Smith of Connecticut, who purchased the scroll while in Egypt in 1862. It lay buried in a Thebes tomb for 3,000 years. After his death in 1906, the scroll was donated to The New York Historical Society by his daughter. It was translated in 1930 by Egyptologist James Henry, along with the medical interpretation prepared by Chicago physician Dr. Arno Luckhardt.

The Papyrus is now at the New York Academy of Medicine, and can be viewed online, with an updated translation, in an interactive scroll at the National Library of Medicine (NLM) website: https://ceb.nlm.nih.gov/proj/ttp/Nash/smith/smith.html

In the introduction to the archival material, NLM Director Donald A.B. Lindberg, MD, said, "The Smith Papyrus is extremely important because it showed for the first time that Egyptians had a scientific understanding of traumatic injuries based on observable anatomy rather than relying on magic or potions."

provider barriers which include lack of awareness or lack of familiarity with current guidelines. The recent ACC/AHA blood pressure guidelines include more than 700 pages; an encyclopedic reference but difficult for any clinician to wade through. Lack of agreement with specific recommendations and lack of outcome expectancy (whether the recommendation will lead to an improved outcome) are underscored by the controversies surrounding the ACC/AHA BP and cholesterol guidelines and the RC. Guideline-related barriers also occur when they are perceived as inconvenient and not easy to use. Elimination of an established behavior may be more difficult to follow than guidelines that recommend adding a new behavior (such as recent ACC/AHA guidelines which no longer recommend aspirin for primary prevention). External barriers include time limitations (during a routine office visit), lack of a reminder system and lack of other office and hospital-based resources and facilities. Finally, and perhaps most limiting of all, are patient-related barriers to guideline acceptance including pharmaceutical cost and insurance coverage. Among the more challenging barriers are patient resistance to medications in general and statins in particular, frequently based on real and perceived concerns regarding side effects. In addition, intermediate and long-term adherence to statin therapy can be surprisingly low. Women, younger patients and minorities tend to have lower adherence rates. Poor adherence to statin therapy also cuts across different degrees of cardiovascular risk. In one study, two-year adherence was 40.1% for patients prescribed a statin after an acute coronary event and 25.4% in patients being treated for primary prevention.[11]

Conclusion

CPGs provide a synthesis of the best and most currently available data, in spite of their apparent limitations. ACC/AHA CV guidelines are complex and at times controversial in a rapidly changing scientific environment with emerging new technologies and pharmacotherapies. As Dr. Harlan Krumholz stated,[12] "CPGs should inform and not dictate, guide not enforce, support not restrict. They can provide options and recommendations to improve quality of care and can highlight points of uncertainty. But they should not reduce physicians to automatons and patients to passive recipients of guideline dictums. The idea of there being a 'right answer' has entangled guidelines in controversy rather than focusing on providing recommendations and promoting choice. There will always be opinions about how to interpret the evidence, whether to recommend therapy based on risk, but it may feel differently if the guideline is not assumed to impose practice." ❖

Author

Kenneth S. Korr, MD, FACC, Associate Professor of Medicine Emeritus, Alpert Medical School of Brown University.

Correspondence

Kskorr1@gmail.com

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Care New England - Brigham health deal will benefit Rhode Island's health care system

This opinion editorial is signed by Care New England Board Chairman Charles Reppucci; Maribeth Williamson and Gary Furtado, Vice Chairpersons; Douglas Jacobs, Treasurer; James Botvin, Secretary; Joseph McGair, Cynthia Patterson, Mario Bueno, Sharon Conard-Wells, Kent Gladding, William Kapos, Patrick Murray, Christina Paxson, George Schuster, James Fanale, MD, President and CEO; Kevin Baill, MD; Jason Boudjouk, MD; Tolga Kokturk, MD.

The proposed acquisition of Care New England by Boston's Brigham Health will enhance Rhode Islanders' quality of care and provide easier, affordable access to health care in Rhode Island, and will have a significant influence on our state's economy.

We are very proud of the many fine local hospitals, doctors and other clinicians Rhode Islanders have as a resource for health care. The principal benefit of the proposed acquisition is the ability to keep patients close to home, as evidenced by the Kent Hospital - Brigham cardiology and colorectal surgery partnership.

The premise of the CNE-Brigham affiliation is to import an enhanced level of health care to Rhode Island. Brigham Health ranks at the top of the list in regional and national performance metrics, in health care as well as in medical education and research. Excellence in these spheres translates into cutting-edge clinical services and new medical technology being available to those who reside within Rhode Island.

A major part of what Brigham Health will bring to Rhode Island is an infusion of medical talent that would be immediately accessible to our community. Not to be ignored, however, is the financial strength of the Partners system, which will lower borrowing costs and provide needed access to capital to renovate our existing facilities and build new, easily accessible patient centered facilities for those requiring less than inpatient hospital care. New capital will provide the means to purchase technologically advanced software and cutting-edge medical equipment.

Hospital costs in the proposed acquisition would remain completely subject to negotiations with Rhode Island health insurers as well as the regulatory oversight of the RI Office of Health Insurance Commissioner (OHIC). Medical decisions in Rhode Island are currently and will continue to be made by physicians licensed in Rhode Island. This is not only good medicine, it is required by law.

The Care New England - Brigham affiliation will safeguard medical education in Rhode Island. The Brown University Program in Medicine has recently renegotiated a new three-way partnership agreement with Care New England and the Brigham.

Also, of note is that there are already three out-of-state health care systems operating in Rhode Island. The Yale – New Haven System with Westerly Hospital, Prospect – Charter Care owning St Joseph and Fatima hospitals and Prime Healthcare owning Landmark in Woonsocket.

The focus of remaining regulatory review of Care New England's proposed acquisition should be on the merits of the transaction and the benefits that will be achieved by expanding CNE's relationship with Brigham Health. The primary questions important to the citizens of this great state are: Does this merger improve the quality and access to health care in Rhode Island? The answer is an unequivocal yes. Will there be any negative impact on the affordability of care in Rhode Island? The answer is clearly no.

We, the Care New England Board of Directors, believe the proposed acquisition of Care New England by Boston's Brigham Health will support high-quality, affordable and accessible care for Rhode Islanders and benefit our state economy. ❖

[*Editor's note: See earlier statements from Lifespan, CNE, Brown, In the News, page 52*]

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Van Northcross, of Barnstable, Massachusetts, Director of Marketing for Cape Cod Hospital (retired), paused on his way across the Margaret Bridge over the Danube in Budapest, Hungary, to confirm the easy worldwide availability of the *Rhode Island Medical Journal*.

Wherever you may be, or wherever your travels may take you, check the Journal on your mobile device, and send us a photo: **mkorr@rimed.org**.

Out-of-Hospital Cardiac Arrest (OHCA) in Rhode Island: Can We Do Better?

NICHOLAS ASSELIN, DO, MS
KENNETH WILLIAMS, MD, FACEP, FAEMS
GUEST EDITORS

In this month's issue of the *Rhode Island Medical Journal* (RIMJ) we have gathered local experts in the management of Out-of-Hospital Cardiac Arrest (OHCA) to present the current state of affairs and a timely assessment of new frontiers in this dynamic field. No Emergency Medical Services (EMS) complaint touches as many parts of our health system like OHCA. The stakes are literally life and death, and yet the outcome in OHCA varies dramatically in the United States health system.[1] Successful management of OHCA requires a series of events described by the American Heart Association as the "Chain of Survival"[2] that starts well before the victim collapses with prevention, system design, training (of bystanders, dispatchers, first responders, EMS and hospital staff), data fidelity and the prepositioning of resources including response assets, defibrillators, and trained bystanders.

Members of the Cumberland Fire and Police Departments assist Cumberland EMS paramedics and physicians during a simulated out-of-hospital cardiac arrest. [PHOTO: JOHN PLIAKAS]

March of 2017 proved to be an important moment for EMS in Rhode Island (RI) as it saw the rollout of a total reimagining of the RI Statewide EMS Protocols and Standing Orders.[3] This revamp touched every level of provider and every disease state, and represented years of effort by committed volunteers and public servants. The EMS Protocols were reformatted and scope of practice and treatments were modified to reflect current best evidence. Traditionally, EMS has focused on the stabilization and rapid transport of life-threatening presentations; however, recent trends in the management of some disease states (like OHCA) have focused on providing timely, high quality care on scene, rather than the prior mantra of "scoop and run" in the severely ill or injured patient.

Following the "chain of survival" concept we open with **JASON RHODES**, et al. and their take on the use of EMS data to plan for, respond to and debrief events like OHCA. Next in the chain, **HEATHER RYBASACK-SMITH,** et al. review the evidence for using dispatchers as "the 1st, first responders" through the delivery of just-in-time CPR instruction for bystanders of OHCA. One of the driving factors behind changes in the OHCA protocol for EMS providers was a realization that the care they provided on scene was in many ways equal to what is provided in the emergency department, and that the quality of these interventions degraded during transport operations, making scene management essential**. LEO KOBAYASHI**, et al. present a subset of data from their STORM Resuscitation trial that demonstrates improved management of OHCA using mechanical adjuncts during transport of the patient.

Changes in EMS Protocols provide unique opportunities to assess their impact across a system. **JONATHAN THORNDIKE**, et al. performed a pilot study of OHCA outcomes comparing the first month of system-wide protocol with the same month the year before. **JOSEPH LAURO,** et al. discuss a case report of a success story from the RI EMS system; a woman who collapsed in her home, was treated there by

EMS providers, and later a community ED, a critical care EMS agency and an academic medical center, going home after a successful outcome. Finally, **TANYA SUTCLIFFE,** et al. review the literature on the management of pediatric OHCA, with particular focus on the differences in arrest etiology, as well as the challenges of managing this population at the scene of their arrest.

We look forward to generating a robust discussion over the management of OHCA in RI and invite our colleagues to share their experiences with these protocol changes. EMS management of OHCA is a dynamic field, and as the science advances nationally, so will our EMS system locally. By embracing a "chain of survival" approach to system design and operations and by gathering and reviewing the relevant data, we hope Rhode Island will join other high performing systems in delivering outstanding care for our patients who need us most, those in cardiac arrest.

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The editors would like to thank the thousands of EMS Providers, Leaders, Physicians and Regulators who form the front lines of the Rhode Island EMS System. Your tireless efforts at improvement are responsible for saving countless lives.

Disclaimers

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the Department of Emergency Medicine, Alpert Medical School of Brown University.

Guest Editors

Nicholas Asselin, DO, MS, Director of Senior Resident EMS Education, Department of Emergency Medicine, Assistant Professor of Emergency Medicine, Clinician Educator, Alpert Medical School of Brown University.

Kenneth Williams, MD, FACEP, FAEMS, RI Department of Health Center for EMS Medical Director; Director, Division of EMS, Department of Emergency Medicine; Professor of Emergency Medicine, Alpert Medical School of Brown University.

Correspondence

Nicholas Asselin, DO, MS
Department of Emergency Medicine
55 Claverick Street, Suite 100
Providence, RI 02903
401-444-2470
nicholas.asselin@brownphysicians.org

Data Utilization in Emergency Medical Services

JASON RHODES, MPA, AEMT-C; KENNETH WILLIAMS, MD, FACEP, FAEMS

KEYWORDS: Informatics, Out-of-Hospital Cardiac Arrest, Emergency Medical Services

INTRODUCTION

Emergency Medical Services (EMS) can be defined as a system that provides acute, urgent care and transportation for the sick and injured. EMS practitioners include professionals at many levels, both volunteer and paid, who are trained in the operational and clinical aspects of EMS. Physicians, nurses, respiratory therapists, pilots, dispatchers, managers, educators, maintenance staff, information technology professionals and others all contribute to the EMS system. Increasingly, EMS practitioners also work in other settings where their training is an advantage, such as hospital and other clinical settings, military and law enforcement, preventive and follow-up care systems, safety and security.

These activities generate data of interest to many, ranging from traffic safety scientists and automotive engineers to epidemiologists and economists. This article reviews some EMS data sources and tools available with a focus on using cardiac arrest data to improve system outcomes.

EMS DATA SOURCES

Sources of EMS data can be grouped into three categories:

1] Logistic data, such as time, date and location of events, names of practitioners and services, patient demographics, health insurance information, etc.

2] Clinical data, such as patient assessment, vital signs, treatment and response, etc.

3] Operational data, such as response time, transport distance, communications recordings, practitioner skill logs, quality assurance reviews, patient safety audits, etc.

Much of this data is available from EMS ambulance responses as they are recorded electronically, instead of by prior paper and audio recording tape systems. Electronic recording, dispatch, and patient charting systems have been the long-term industry standard in EMS.–Software vendors offer systems for computer-aided dispatch (CAD), patient charting, quality assurance review, personnel management, GIS mapping of EMS incidents, and other functions. Digital audio recording software now offers transcription and search functions. These advances make EMS data more available for analysis. For most patients, however, outcome data remains separate from the EMS dataset, and requires abstraction or query from hospital databases.

EMS DATA HISTORY

In 1973, state EMS directors realized that there was no standard format or process for gathering and comparing data from one state, one service, one provider, or one patient to another. There was increasing interest in such comparisons as hospital networks and speciality centers developed, ambulances more often crossed state lines, and large ambulance services formed. The emergency medical services system act of 1973 identified 15 essential components of an EMS system, thus creating a rudimentary framework for EMS data collection.[1]

Some systems began extracting data from paper reports or using early scannable paper database systems. Rhode Island had one of the earliest statewide EMS data systems, starting in the 1990s.

The 1990 Utstein style of EMS data reporting for cardiac arrest patients created a more detailed set of EMS data elements and allowed comparison between systems.[2] In 1994, the National Highway Traffic Safety Administration's Office of EMS (NHTSA EMS) developed a national consensus document that defined the first national prehospital EMS data set, with 81 thoroughly defined data elements. This data set formed the foundation for the National EMS Information System, NEMSIS, which was established in 2001. Version 3.5 of the EMS data dictionary is currently in development and encompasses over 500 data elements. The NEMSIS data registry includes data from over 30 million EMS activations submitted by over 10,000 agencies serving 49 states and territories.[1]

While this is an impressive national data set and a unique healthcare enterprise that can answer many research questions, for privacy and efficiency reasons the national data set does not include many elements that are important at state, regional, or individual service, provider, or patient levels. However, similar software is in use at these levels and allows robust local analysis. As is true with any large database where the information is entered without significant oversight, the NEMSIS dataset contains some inaccurate

data. However, improvements in data entry rules, physician quality assurance review of EMS charts, and increased understanding of the importance of accurate EMS data should gradually improve data quality. Thus, there is an EMS data pyramid, with a broad base representing individual and local data tapering to a smaller (but still robust) data set at the national level. Topics of particular interest, such as cardiac arrest, highway crash incidents, epidemics, and opiate overdose, merit focused databases.

CARDIAC ARREST DATA AND CARES

For cardiac arrest, independent projects to gather data and benchmark using the Utstein guidelines developed, culminating in the Cardiac Arrest Registry to Advance Survival (CARES) in 2004. CARES was formed through collaboration between the CDC and Emory University's Department of Emergency Medicine. The CARES registry began collecting data in the Atlanta area in 2005 with 600 patients, and has now expanded to statewide data collection in 23 states and 63 community efforts in an additional 18 states, as well as 8 countries outside the US. The registry now includes over 350,000 patients representing the efforts of over 1,400 EMS agencies and 1,800 hospitals.[3] A major use of the CARES registry is benchmarking, as seen in **Figure 1**, with individual agencies able to perform both internal benchmarking against prior performance as well as comparison with like

Figure 1A. Overall Survival Rate Comparison

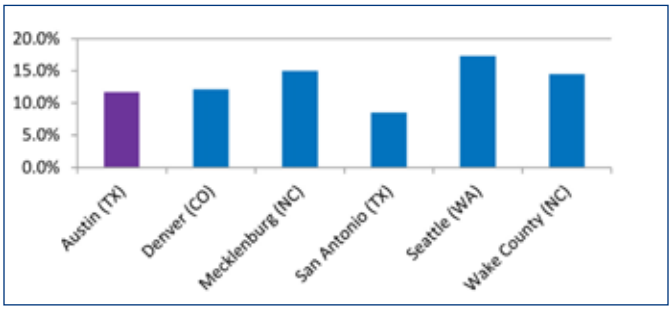
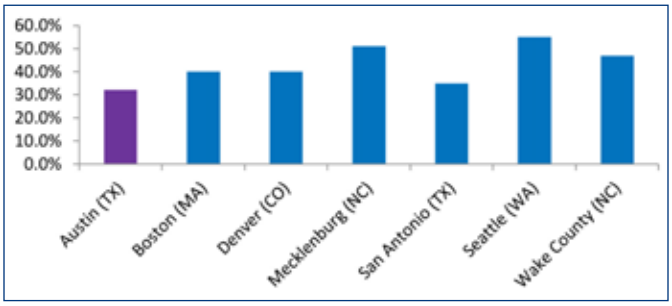


Figure 1B. Utstein Survival Rate Comparison



Source: CARES data obtained from Medical Directors for various EMS providers, June 2013

CARES Survival Rate Comparison, 2012 data
https://mycares.net/sitepages/uploads/2015/CARES%20in%20Action%20Abridged.pdf Accessed Aug. 2018.

Figure 2. CARES Registry Sites

systems or the registry in general. The project also allows discussion of diversity and location information.

Since the NEMSIS database has evolved to include most of the 66 CARES registry elements, barriers to membership have decreased, but abstraction of hospital data still requires significant personnel effort. CARES membership fees present a significant hurdle to many states and agencies, currently including Rhode Island, as shown in **Figure 2**.[4] However, the involvement of focused and dedicated data abstraction personnel also means that the CARES dataset is likely more accurate than the NEMSIS data cube.

In Rhode Island, there is interest in CARES enrollment, currently complicated by lack of funding. However, other efforts are underway including inclusion of CARES elements in the RI EMS data set and efforts to search both traditional data and parse narrative data to develop a strong and accurate statewide EMS database for research and quality purposes.

CASE EXAMPLES

Several hypothetical case examples illustrate the capabilities and utility of EMS data analysis.

Case 1: Individual Patient Data

A 68-year-old male patient has diabetes and congestive heart failure. He lives alone, has poor vision due to diabetic retinopathy. He often has difficulty taking his medication properly but does not qualify for home nursing services. About twice a month, he calls 911 due to symptoms of his chronic diseases, and is often hospitalized. Noting this pattern of readmission, a case management meeting occurred, involving the local EMS agency and their data system. From an analysis of their individual EMS run data, the care team determines that many of his 911 calls have been related to medication errors. With the patient's permission, he is entered into a community paramedicine program where

members of the EMS agency visit him at home and assist him with medication dosage and compliance, reducing the need for 911 calls and re-hospitalization.

Case 2: State System Data Improves Cardiac Arrest Care

A state EMS office receives several complaints about questionable resuscitation rates in some communities. In a number of cases during the prior year, patients suffering cardiac arrest in these communities had long waits for EMS care. A query of the prior year's EMS data identifies the set of patients with witnessed and unwitnessed cardiac arrest, and identifies those with bystander CPR, including those who received CPR instructions via 911/Dispatch. After analysis, there does not appear to be discrimination based on cultural or ethnic characteristics, place of residence, responding agency or provider. However, most of the patients in question had their emergency occur during peak call volume times of day, contributing to the prolonged response times. After discussion with several involved providers, the state office determines that low percentages of bystander CPR and dispatcher instruction in CPR via telephone represent a gap in the current system. Focused efforts in both areas begin, and resuscitation rates rise compared with prior year baselines.

Case 3: National Data Reveals Health System Patterns

Syndromic surveillance of EMS data in real time by the National Collaborative for Bio-Preparedness, enabled by BioSpatial, is currently in place.[5] This capability, dependent on prompt uploading of individual EMS system data to state databases and a cooperative agreement between state EMS offices and BioSpatial, monitors a number of syndromes of national interest (cardiac arrest, opiate overdose, motor vehicle crashes, gastrointestinal symptoms, influenza-like illness, etc.). Data at the national level is scrubbed and averaged to avoid privacy concerns, but at the state and service level the system allows access to the original data (at the same level these entities already enjoy). **Figure 3** depicts a year of Rhode Island cardiac arrest data as a heat map – the southernmost portion of the state not visible due to map zoom range.

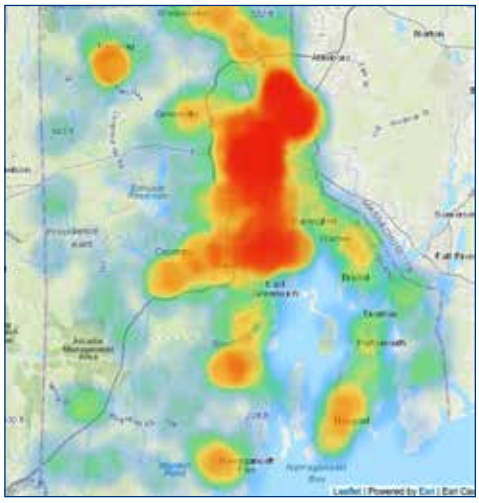


Figure 3. Rhode Island EMS Cardiac Arrest Volume Heat Map (Year prior to 2018 Aug.) Biospatial analysis of RI Department of Health data.

Such EMS data analysis and syndromic surveillance can be used to uncover clusters of foodborne illness and aid in tracking the source, find concentrations of opiate overdose patients to enable community response, and identify the location of accident-prone intersections and segments of highway to facilitate traffic engineering improvements. Surveillance of cardiac arrest data enables identification of neighborhoods at risk due to lack of EMS coverage, AED availability, or low rates of bystander CPR.

SUMMARY

Availability of robust electronic EMS data and tools to share, analyze, and report these data have profound implications for the healthcare system, ranging from ability to improve individual patient disease management to national level syndrome identification and response. Today's data systems and analysis tools, including the NEMSIS Data Cube, the CARES registry, and the National Collaborative for Bio-Preparedness BioSpatial graphic information system analysis and mapping capabilities, provide powerful real-time capabilities for understanding EMS data and improving care across our prehospital system.

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Authors

Jason Rhodes, MPA, EMT-C, Chief of the Center for Emergency Medical Services, RI Department of Health.

Kenneth Williams, MD, FACEP, FAEMS, RI Department of Health Center for EMS, Medical Director; Director, Division of EMS, Department of Emergency Medicine,Professor of Emergency Medicine, Alpert Medical School of Brown University.

Correspondence

Kenneth Williams, MD, FACEP, FAEMS
Department of Emergency Medicine
55 Claverick Street, Suite 100, Providence, RI 02903
401-444-5286
kenneth.williams@brownphysicians.org

A History and Overview of Telecommunicator Cardiopulmonary Resuscitation (T-CPR)

HEATHER RYBASACK-SMITH, MD, MPH; JOSEPH LAURO, MD, FACEP

ABSTRACT

Few events in pre-hospital medicine inspire as much attention and resources as out-of-hospital cardiac arrest (OHCA), yet the survival rate for such events has remained stagnant and unacceptably low. The first links in the chain of survival are early recognition and early CPR; yet EMS services do not arrive to the scene of a medical call for on average 7 minutes. Emergency dispatchers are generally the first trained individuals involved in medical emergencies; they can provide pre-arrival instructions, specifically telecommunicator CPR (T-CPR), and represent the potential to double the bystander CPR rate and increase return of spontaneous circulation. Yet, according to survey data, fewer than half of all public safety answering points (PSAPs) provide any T-CPR and even fewer provide hands-only CPR instruction.[1] This article will provide a brief overview, history and introduction to the evidence supporting the use of T-CPR to improve outcomes in OHCA.

KEYWORDS: Cardiac Arrest, Emergency Medical Dispatch, Telecommunicator CPR, Emergency Medical Services

INTRODUCTION

Although the actual incidence in not tracked in Rhode Island, extrapolations would suggest that every year an estimated 1,000 people suffer an out-of-hospital cardiac arrest (OHCA), when their heart stops beating normally.[2] Of these, approximately 40% are witnessed.[3] Although an estimated 25–50% of all OHCAs are due to a treatable arrhythmia like ventricular fibrillation (VF), the rate of survival to hospital discharge after a witnessed OHCA is estimated to be 31.4%.[3] This number has remained stagnant for years, with the exception of isolated, high performance EMS systems. Factors that increase the survival rate for witnessed cardiac arrest include bystander CPR, early AED and early advanced cardiac care. Multiple studies have shown that bystander CPR doubles rates of survival in OHCA;[4,5] however, the rate of bystander CPR in Rhode Island is an abysmal 20% in recent data analysis[6] and across the country remains a stagnant 40%.[5] In other words, in Rhode Island, up to 80% of cardiac arrest victims must wait for the arrival of EMS services before CPR is initiated.

Survival decreases by around 5% for each minute between cardiac arrest and the initiation of CPR and yet EMS response times in urban settings are on average 7.0 (SD 4.4) minutes, 7.7 (SD 5.4) minutes in suburbia and 14.5 (SD 9.5) minutes in rural settings.[7] Anoxic brain injury can occur after just a few moments following cardiac arrest. Bystander CPR, whereby CPR is performed by untrained bystanders prior to EMS arrival, can bridge this gap, buying valuable time for the initiation of Advanced Cardiac Life Support (ACLS) protocols. Unfortunately although the general public widely recognizes the importance of CPR, bystander CPR rates remain low nationally.[5]

One proven way to increase the rates of bystander CPR is through the use of telecommunicator CPR (T-CPR). Across the country, from Rochester to Seattle, communities have dramatically increased their cardiac arrest survival rate with programs that include evidence-based, quality- controlled, physician-led, dispatcher-assisted CPR. Arizona now has an overall survival rate of 35% for VF cardiac arrest.[8] In Rochester, victims of witnessed VF arrest have a 50% chance of survival.[9] In Seattle/King County, WA, the survival rate for witnessed VF arrest in one analysis was 62%![10]

WHAT IS T-CPR?

T-CPR is defined as the "provision of CPR instructions by emergency dispatchers and call-takers to 9-1-1 callers who potentially encounter cardiac arrest."[11] T-CPR is real-time, over the phone CPR instruction given to bystanders by trained emergency dispatchers with a goal of having "hands on the chest" within 3 minutes of the 9-1-1 call.

T-CPR is part of a group of standardized, scripted pre-arrival instructions. These pre-arrival instructions are designed to provide immediate, life-saving interventions prior to the arrival of EMS, by bystanders under the instruction of trained medical dispatchers. Pre-arrival instructions, when provided by certified Emergency Medical Dispatchers (EMDs) have been proven safe, effective, and lifesaving.[11] Trained 9-1-1 operators coach people through immediate measures such as CPR as well as for other emergencies like bleeding control, choking, or assistance for drug overdose victims, meanwhile collecting key information for

emergency responders prior to their arrival. T-CPR has been included in the American Heart Association guidelines for resuscitation care since 2010, and has been graded as the highest level (Class I) recommendation in the most recent 2017 guidelines.[12] Pre-arrival instructions such as T-CPR enable emergency medical dispatchers to be the true first responders to medical emergencies, buying valuable time for patients suffering life-threatening illness or injury.

T-CPR employs a rapid triage assessment of the victim, using a "no, no, go" paradigm. This consists of a two-question screening: 1) Is the patient conscious? 2) Is the patient breathing normally? If the answer is no to both questions, the telecommunicator gives brief, easy to understand instructions to the caller. Generally this involves getting the patient to a flat, hard surface, placing hands on the chest and pushing hard and fast with coaching by the telecommunicator.

HISTORY OF T-CPR

Modern CPR has evolved over the last half century alongside the evolution of organized EMS, medical dispatch and the specialty of Emergency Medicine. Though the first documented instances of chest compressions occurred as early as the 1800s, CPR as we know it today was created in the mid-20th century. In the early 1960s, the American Heart Association (AHA) formerly endorsed CPR and created the first program to teach what was then called "closed chest cardiac massage" to physicians in the hospital setting.[13] By the 1960s, EMS was becoming more organized, and CPR quickly became standard instruction for newly minted EMS providers. The provision of CPR training to laypeople soon followed. The very first documented instruction of laypeople in CPR took place in Cleveland in 1961,[14] and the 1970s marked the first large-scale rollout of CPR training to the lay public. In 1972, Leonard Cobb held the first public CPR training in Seattle, WA[14] and by the end of the 1970s ACLS was developed at the third national conference on CPR.[13] It was some years later that emergency medical dispatchers began offering instructions to callers.

The very first documented pre-arrival instructions were provided in 1975 by paramedic Bill Tune in Phoenix, AZ.[15] Paramedic Tune gave spontaneous, unscripted instructions to the mother of a child who was not breathing. The child survived and Phoenix began routinely offering non-standardized, non-scripted, pre-arrival instructions.[15] However, despite this (and likely other undocumented occurrences), T-CPR was not widely adopted until later, following the development of the EMD and standardized EMS dispatch protocols. Utah boasted the first formal training program for emergency dispatchers and also was the first state to require use of medically approved dispatch protocols in 1983. This was the same year the US Department of Transportation issued a sample curriculum and protocol for EMD training.[15] Throughout the 1980s multiple jurisdictions across the US began using pre-arrival instructions for critical events like CPR, choking and childbirth and T-CPR began to be formally incorporated into dispatch center protocols.

EVIDENCE TO SUPPORT USE OF T-CPR

Survival from OHCA requires complex systems of care and chain of survival that begins with early access to CPR and an Automatic Defibrillator (AED), continued with robust pre-hospital management of cardiac arrest and care at the hospital. Dispatcher-assisted bystander CPR has been shown to improve survival especially when integrated with other links in the chain like AED use, more CPR education and advanced systems of care.[11,16]

Studies have shown that bystander CPR increases rates of survival by over 200% in OHCA.[4] Though most Americans are familiar with CPR,[17] rates of bystander CPR remain very low.[5] T-CPR pre-arrival instructions have been shown to double the rates of bystander CPR,[16] are nearly as effective as CPR provided by a trained medical professional,[11] are expected by the general public[17] and have been shown to be feasible and effective.

Phoenix, AZ, provides an example of the positive survival effects of institution of effective T-CPR programs. Phoenix previously provided pre-arrival CPR instructions at regional dispatch centers but had not adopted formal, evidence-based guidelines for identification of OHCA, quality improvement or training. They instituted a T-CPR bundle of care based on AHA guidelines for T-CPR, including guideline-based protocols, training, data collection and feedback to two regional dispatch centers and analyzed before-and-after outcome data. Among the favorable outcomes seen in before-and-after analysis were: 9.3% increase in provision of T-CPR (95% CI, 4.9%–13.8%), all rhythm survival increase from 9% to 12% (aOR 1.47 [95% CI, 1.08–2.02]), survival after shockable rhythm 35% from 24.7% (aOR 1.70 [95% CI, 1.09–2.65]), and a favorable functional outcome of 8.3%, up from 5.6% (aOR 1.68 [95% CI, 1.13–2.48]).[18] Other cities have observed increases in bystander CPR, survival to discharge and good neurologic outcome after the initiation of T-CPR and T-CPR quality improvement/training protocols.[19]

Across the country, from Rochester to Seattle, communities have dramatically increased their cardiac arrest survival rate with programs that include dispatcher-assisted CPR, but T-CPR alone is not a panacea. There are, and likely will remain, many barriers to performance of bystander CPR including patient positioning and location and the ability of the bystander to physically perform effective compressions. Based on the experience of high-performance systems such as Seattle/Kings County and Rochester, T-CPR must be a part of a vibrant, robust EMD program with quality assurance and improvement, data collection and tracking and physician involvement. Public Safety Answering Points (PSAPs), the call centers responsible for answering calls to

an emergency telephone number for emergency services, must be provided the oversight, budget, staffing and training to accomplish the goals of evidence-based EMD, including T-CPR. Future directions of EMD may include CPR instructions provided via smart phone, use of drones to deliver AEDs and provide CPR instruction and feedback, and smartphone, social media-based deployment of CPR-trained Samaritans to public OHCA. These ideas have been explored and imagined in various settings and are the subject of active research efforts.

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Authors

Heather Rybasack-Smith, MD, MPH; Division of EMS, Department of Emergency Medicine, Assistant Professor of Emergency Medicine, Clinician Educator, Alpert Medical School of Brown University.

Joseph Lauro, MD, FACEP; Division of EMS, Department of Emergency Medicine, EMS Medical Director, Miriam and Newport Hospitals, Clinical Associate Professor of Emergency Medicine, Alpert Medical School of Brown University; Associate Medical Director: Cumberland Paramedics.

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Correspondence

Heather Rybasack-Smith, MD, MPH
Department of Emergency Medicine
55 Claverick Street
Providence, RI 02903
401-444-5286
heather.rybasack-smith@brownphysicians.org

Comparison of EMS Provider In-Transit Performance and Exertion with Standard and Experimental Resuscitation Protocols during Simulated Out-of-Hospital Cardiac Arrest

LEO KOBAYASHI, MD; NICHOLAS ASSELIN, DO, MS; BRYAN CHOI, MD, MPH;
MAX DANNECKER, NREMT; KENNETH WILLIAMS, MD, FACEP, FAEMS

ABSTRACT

OBJECTIVE: To assess the effect of a device-assisted out-of-hospital cardiac arrest (OHCA) resuscitation approach on provider performance during simulated transport.

METHODS: BLS and ALS providers were randomized into control and experimental teams. Subjects were fitted with wireless heart rate (HR) monitors. Control teams simulated with standard protocols and equipment; experimental teams with resuscitation-automating devices and goal-directed protocols. Chest compression quality, pulmonary ventilation, defibrillation, and medication administration tasks were monitored; subjects' HR's were continuously recorded.

RESULTS: Ten control and ten experimental teams completed the study (20 EMT-B's; 1 EMT-I, 8 EMT-C's, 11 EMT-P's) with similar resting HR's and age-predicted maximal HR's (mHR). All exhibited suboptimal in-transit resuscitation quality during initial simulations; HR did not differ significantly between the groups. Experimental teams exhibited improved chest compression and ventilation quality during transport along with lower subject HR.

CONCLUSION: OHCA resuscitation automation improved the in-simulation quality of critical in-transit tasks and reduced provider exertion.

KEYWORDS: Medical Simulation, Cardiac Arrest, Mechanical CPR, Workload

INTRODUCTION

The delivery of meaningful cardiopulmonary resuscitative care during patient transport is challenging.[1-3] While in motion, even basic tasks and actions can become complicated and difficult regardless of provider experience and skill.[3] In order to explore potential ways to assist Emergency Medical Service (EMS) providers in their delivery of high-quality care in challenging pre-hospital environments, investigators initiated the Standardized Treatment and Optimal Resuscitation through Mechanical Adjuncts (STORM) program.[4,5] Focusing on the aspects of cardiac resuscitation repeatedly observed to be suboptimal,[6,7] the program studied the experimental, goal-directed integration of BLS and ACLS principles into an alternative algorithmic approach for standardized and streamlined patient care.

The overall STORM program employed a study design that incorporated on-scene and in-transit simulation of pre-hospital OHCA resuscitation; study metrics were chosen for objective assessment of resuscitation task performance quality and workload in mixed-response (BLS-ALS) teams. This manuscript presents the *in-transit* aspects of the program's simulation-based comparison of EMS teams employing standard and experimental OHCA resuscitation protocols and equipment.

METHODS

Study Design

The study used a randomized, non-blinded, controlled experimental design. The research program was conducted at a hospital-affiliated academic simulation center. Emergency Medical Technicians (EMT) licensed at the Basic (B), Intermediate (I), Cardiac (C) or Paramedic (P) levels were recruited through regional EMS events and networks. Interested and qualifying subjects were paired and scheduled as two-provider teams (one EMT-B and one EMT-I/C/P. The overall STORM program and the in-transit component were approved by the hospital institutional review board.

Study Protocol and Metrics

Accepted formats for reporting of cardiopulmonary resuscitation quality (*e.g.*, guidelines set forth by Kramer-Johansen et al.[8]) were reviewed and modified for programmatic objectives. Core performance metrics were selected *a priori* for chest compression (hand position, depth, rate and release) and pulmonary ventilation (rate, volume). Proportions of transport time without any compressions and without adequate compressions were selected as composite performance metrics.

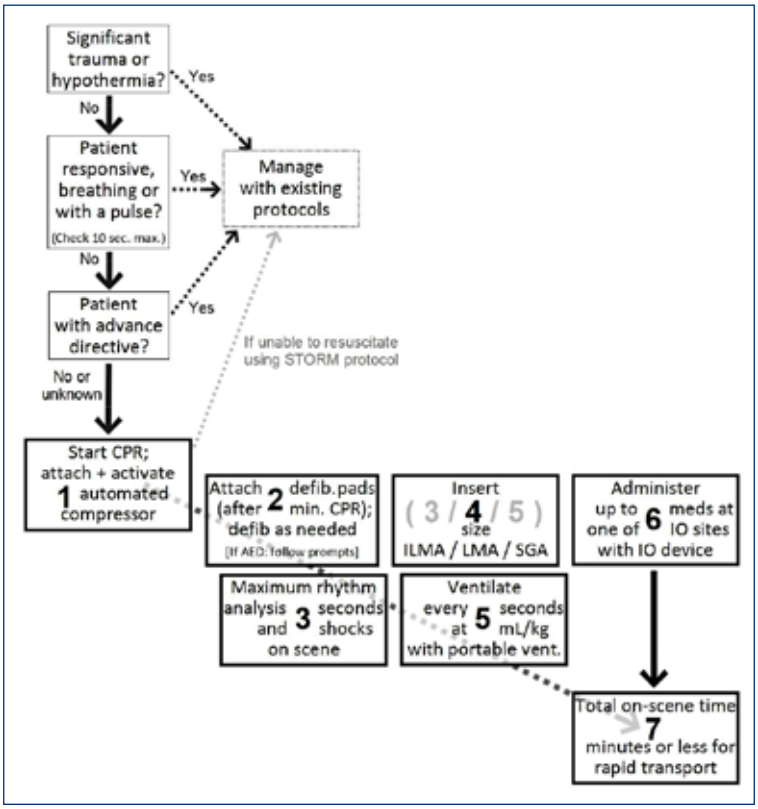
The STORM research protocol[4,5] specified unobtrusive measurement of subject exertion and effort during on-scene and in-transit resuscitation through measures of physiologic stress and self-reports of perceived workload on validated assessment tools (NASA-TLX and Borg RPE). Investigators configured Polar H7 (Polar Electro, Lake Success, NY) chest strap systems to monitor subjects' heart rates (HR) through

wirelessly-paired iPod Touch devices (Apple, Cupertino, CA) running DigiFit app software (DigiFit, Santa Barbara, CA). The iPods were configured to store and export summary reports of subjects' monitoring duration, average HR and time-vs.-HR plot for each simulation.

Experimental Resuscitation Protocol and Equipment

Provider-assistive devices were reviewed for specific OHCA tasks, *i.e.*, chest compression,[3,9] defibrillation,[10,11] advanced airway management,[12-14] pulmonary ventilation,[15] vascular access, and medication administration.[16] The program built on these efforts and developed a systems-based, experimental re-engineering of OHCA response. Specifically, a step-wise algorithm to enable small teams to expeditiously perform multiple complex interventions was designed with a mnemonic aid and modular assortment of select equipment (see **Figure 1**). The experimental equipment setup consisted of the following devices: automated chest compressor (LUCAS 2, Jolife AB / Physio-Control, Lund, Sweden), supraglottic airway device (King LT, Kingsystems, Noblesville, Indiana; Aura-I ILMA without endotracheal tube, Ambu, Ballerup, Netherlands), battery-powered portable mechanical ventilator (EPV-200, Allied Healthcare Products, St. Louis, Missouri), powered intraosseous access device (EZ-IO, Vidacare, San Antonio, Texas), defibrillator with AED mode (Zoll R series +, Zoll, Chelmsford, Massachusetts) and simulated ACLS medications (SimulAids, Saugerties, New York). Fully in compliance with American Heart Association life support guidelines, the protocol and equipment selection were simulation-tested on the SimMan 3G simulator (Laerdal, Wappingers Falls, NY) and recursively revised by investigators for utility, usability and safety.

Figure 1. Experimental pre-hospital sudden cardiac arrest resuscitation protocol with assistive devices.



Study Sessions

Standardized preparatory instructions were emailed prior to study sessions. Subjects were consented, randomly assigned as a team to either the control or experimental group, oriented to the simulation environment, and surveyed on demographic and licensing information, resuscitation training and experience, current practice setting, and previous simulation exposure. Each subject was fitted with a HR monitor and tested for signal transmission and accuracy of DigiFit HR measurements. After passive exposure to a relaxing nature video presentation for one minute, each subject's stable resting HR was recorded over a minute and his/her age-predicted maximal HR (mHR) was calculated with the Tanaka formula.[17]

Subjects were brought into the study area at the start of their first simulations then instructed to resuscitate and transport a simulated OHCA patient. While being videotaped and monitored for performance and HR, study teams performed simulated OHCA resuscitation with transport of the manikin 250 feet through an office building on an ambulance stretcher.

Between the first and second simulations, control teams completed a 35-minute high-performance cardiopulmonary resuscitation review with hands-on manikin compression training and real-time objective feedback. The experimental group's intervention consisted of a 35-minute presentation on the program's alternative pre-hospital OHCA resuscitation approach; subjects completed didactic and hands-on training with the experimental protocol and associated equipment. Second simulations (with the same OHCA scenario as first simulations) were completed by control and experimental groups immediately after the just-in-time training interventions; performance metrics and HR data were collected in real time.

Data Analysis

Subject demographics, clinical and training experience were compared between study groups for failure of randomization with Fisher exact and Mann-Whitney *U* tests. Teams' resuscitation performance data were extracted from audiovisual records using StudioCode (SBG, Camarillo, CA). These data were synchronized with the manikin log dataset and analyzed with Excel (Microsoft, Redmond, WA); medians and

interquartile ranges (IQRs) were calculated. Performance changes (Δ) within each study team from first simulation to second simulation were determined along with the differences between control and experimental groups' changes (Δ(Δ)); Mann-Whitney *U* tests were completed with an alpha of 0.05 for significance on the within-group Δ and between-group Δ(Δ) values. Subjects' DigiFit-exported HR plot image files were processed with DigitizeIt (Bormisoft, Brunswick, Germany) optical plot recognition (OPR) software to extract their HR data. Each subject's average HR during simulated patient transport was then used to determine his / her in-transit level of exertion; the subject's resting HR and age-predicted mHR were used to define his / her expected range of exertion. Within-subject changes in HR from baseline, *e.g.*, ΔHR_1 = simulation 1 HR - resting HR, and in percentage of mHR attained (Δ%mHR) were calculated for each simulation, where each subject acted as his/her own control; these data were used to derive between-group differences in ΔHR and Δ%mHR for analysis with Mann-Whitney *U* tests.

RESULTS

Twenty EMT-B's, one EMT-I, eight EMT-C's and eleven EMT-P's were recruited into 20 BLS-ALS teams over the two-year study period; seven recruited subjects who failed to present for study sessions were excluded. Control and experimental groups were similar in age and sex, clinical training, and simulation exposure. Levels of clinical experience were different for control and experimental ALS providers (supraglottic airway use, p<0.01; mechanical ventilator use, p=0.05; and intraosseous needle insertion, p<0.01), see **Table 1** for details.

Total simulation time and the duration of transit (as a percentage of simulation time) at baseline were similar (median and interquartile range [IQR] 1–3) at 1,174 (860–1,197) seconds and 8.9% (7.1%–9.9%) for control groups, and 1,060 (993–1,217; NS) seconds and 9.1% (6.6%–11.4%; NS) for experimental groups. Total resuscitation time was shorter in second simulations (p≤0.01 for both groups) without changes in duration of transit time (NS for both groups).

Control and experimental groups performed chest compressions at baseline without significant differences in hand position, depth, rate and chest release; proportions of in-transit resuscitation time without adequate compressions were similarly high for both groups (NS). Pulmonary ventilation was generally inadequate by all teams (NS); defibrillations and medications were infrequently administered during transport (data not shown). Control teams did not exhibit changes in compression or ventilation metrics across simulations. During second simulations, teams using the experimental protocol and equipment performed deeper compressions (+19mm [15–26mm, p<0.01]) with better release and a trend toward faster compressions; their change in in-transit resuscitation proportion without adequate compressions did not attain significance (p=0.11). Experimental teams improved their minute ventilation volumes during second simulations (+2,893mL/min [2,120-3,670ml/min, p<0.01]). The within-group changes across simulations for compression depth, chest release and ventilation rate were significantly different between control and experimental groups, see **Table 2** for details.

Both resting HR and age-predicted mHR did not differ significantly across study groups or by provider level. During first simulation transports, the median change in average HR, *i.e.*, ΔHR from resting HR, was +80.7bpm (72.9–92.1bpm) and +66.7bpm (53.0–83.1bpm) for control BLS and ALS subjects, respectively. Experimental BLS and ALS subjects displayed similar increases in average HR during first simulation transports, and there was no significant difference in the percentage of age-predicted mHR attained by control and experimental teams (comparison data not shown).

Control teams' ΔHR during second simulation transports were not different from their first simulation ΔHR. The experimental teams' second-simulation ΔHR of -23.6bpm (-29.4– -11.3bpm) for ALS providers was significantly lower than their first-simulation ΔHR (p=0.04). Changes across simulations in percentage of mHR attained, *i.e.*, Δ%mHR, were different for control and experimental teams: BLS providers' median Δ%mHR: -5.1% (-10.9%– -0.3%), p<0.01, relative to controls' +3.0% (2.4%–7.3%); ALS providers: -12.3% (-16.0%– -6.1%), p=0.02, relative to controls' +0.2% (-5.3%–2.6%), see **Table 3**.

DISCUSSION

Findings from the STORM program's completed research components suggest that an experimental, device-assisted protocol may improve the quality of select *on-scene* resuscitative tasks while reducing provider workload without similar improvements from a control, high-performance CPR training intervention.[4,5] In-transit study subjects' suboptimal baseline resuscitation performances during patient transport were consistent with the poor resuscitative quality observed in previous live[1] and simulation[2] investigations. Although limited to 250 feet of stretcher-assisted movement over even terrain in approximately 1.5 minutes, study teams using standard protocols and equipment consistently failed to meet AHA-specified chest compression rates and depths as well as pulmonary ventilation rates and volumes.

Despite this poor clinical performance, subjects' HR's generally doubled from resting rates during the transportation phase of study simulations and registered at approximately 80% of their age-predicted maximal heart rates. In healthy individuals, this level of exertion and physiologic activation could be concerning with respect to their ability to function effectively as EMS providers – equivalent levels may be hazardous in pre-hospital workers with cardiopulmonary comorbidities.

A structured and hands-on intervention for high-performance CPR failed to meaningfully improve compressive

Table 1. Comparison of subjects' demographic, clinical experience and previous training characteristics by study group and provider level.

Subject Characteristic (units)	Control Group (median and inter-quartile ranges unless specified otherwise)		Experimental Group (median and inter-quartile ranges unless specified otherwise)		p[Ψ]	
	BLS provider	ALS provider	BLS provider	ALS provider	BLS provider	ALS provider
Demographic Information						
Age (years)	25.5 (23.3–27.8)	32.5 (28.0–44.5)	25.0 (24.0–26.0)	31.0 (26.5–33.8)	0.91	0.47
Gender (female, %)	10%	10%	20%	0%	1[ω]	1[ω]
Primary current clinical role (n)	EMT-B: 10	EMT-I: 0 EMT-C: 2 EMT-P: 8 (RN: 1)	EMT-B: 10	EMT-I: 1 EMT-C: 6 EMT-P: 3 (RN: 2)	1[ω]	1[ω]
Pre-hospital clinical employment (years)	2.0 (1.3–2.8)	5.0 (5.0–9.0)	3.0 (1.6–4.8)	7.0 (6.0–12.5)	0.26	0.43
Pre-hospital patient load (patients per week)	35.0 (15.0–42.3)	5.0 (4.3–10.0)	15.0 (7.6–23.8)	22.5 (8.5–25.0)	0.10	0.10
Clinical Experience						
Out-of-hospital cardiac arrest resuscitation in primary provider role (n)	0.0 (0.0–4.0)	35.0 (10.5–50.0)	1.5 (1.0–16.5)	20.0 (11.3–43.8)	0.20	0.97
External CPR chest compression (patients)	0.0 (0.0–1.8)	35.0 (2.8–50.0)	1.5 (1.0–12.3)	22.5 (11.0–43.8)	0.14	0.97
Automated chest compression device application (patients)	0.0 (0.0–0.8)	9.0 (2.0–10.0)	0.5 (0.0–2.0)	1.5 (0.0–6.8)	0.43	0.13
Semi-automated / manual defibrillation (patients)	0.0 (0.0–0.0)	16.0 (1.0–45.0)	0.0 (0.0–1.5)	7.5 (3.5–23.8)	0.62	0.82
Bag-valve-mask ventilation (patients)	0.5 (0.0–1.8)	40.0 (7.5–50.0)	3.0 (1.0–16.5)	27.5 (11.0–63.8)	0.09	0.85
Endotracheal intubation (patients)	0.0 (0.0–0.0)	16.5 (0.3–40.0)	0.0 (0.0–0.0)	5.5 (3.0–41.3)	0.73	0.85
Supraglottic airway device use (patients)	0.0 (0.0–0.0)	5.0 (3.0–7.8)	0.0 (0.0–0.0)	0.0 (0.0–1.8)	0.73	<0.01
Mechanical ventilator use (patients)	0.0 (0.0–0.0)	4.5 (1.3–14.3)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	1	0.05
Intravenous catheter insertions (patients)	0.0 (0.0–0.0)	40.0 (2.8–387.5)	0.0 (0.0–0.0)	75.0 (16.3–150.0)	1	0.67
Intraosseous needle insertions (patients)	0.0 (0.0–0.0)	17.5 (6.0–38.8)	0.0 (0.0–0.0)	0.5 (0.0–4.3)	0.73	<0.01
Previous Training (In-servicing)						
Automated chest compression device (%)	20%	80%	50%	50%	0.27[ω]	0.35[ω]
Semi-automated/manual defibrillation (%)	90%	100%	70%	90%	0.47[ω]	1[ω]
Endotracheal intubation (%)	70%	100%	30%	100%	0.14[ω]	1[ω]
Supraglottic airway device (%)	40%	100%	80%	100%	0.14[ω]	1[ω]
Mechanical ventilator use (%)	0%	90%	10%	40%	0.73[ω]	0.06[ω]
Intravenous catheter insertion (%)	50%	100%	20%	100%	0.27[ω]	1[ω]
Intraosseous needle insertion (%)	40%	100%	20%	80%	0.47[ω]	0.47[ω]
Simulation Experience (%)						
	None: 40% Limited: 30% Moderate: 30% Significant: 0%	None: 10% Limited: 0% Moderate: 30% Significant: 60%	None: 30% Limited: 20% Moderate: 30% Significant: 10%	None: 0% Limited: 20% Moderate: 50% Significant: 20%	1[ω]	0.15[ω]

Table excerpted from Choi B, Asselin N, Pettit CC, Dannecker M, Machan JT, Merck DL et al. "Simulation-based Randomized Comparative Assessment of Out-of-Hospital Cardiac Arrest Resuscitation Bundle Completion by Emergency Medical Service Teams Using Standard Life Support or an Experimental Automation-assisted Approach." Sim Healthcare 2016:11(6), 365-375

[Ψ]Mann-Whitney U test unless specified otherwise [ω]Fisher exact test (2x2, 2x3 or 2x4)

Table 2. Comparison of in-transit simulated resuscitation task performance and quality by study group during first and second simulations.

Resuscitation Quality Metric (units; [recommended performance], if specified[λ])	Control Group (Standard out-of-hospital cardiac arrest resuscitation protocol and equipment; median and inter-quartile ranges)				Experimental Group (Experimental out-of-hospital cardiac arrest resuscitation protocol and equipment; median and inter-quartile ranges)				Between-simulation Δ by group (Δ[Δ]) p^{Ψ}
	Simulation 1 (n=9)	Simulation 2 (n=10)	Δ	p^{Ψ}	Simulation 1 (n=10)	Simulation 2 (n=10)	Δ	p^{Ψ}	
Simulation									
Total simulation duration (sec)	1,174 (860–1,197)	689 (562–801)	-339 (-448– -186)	0.01	1060 (993–1,217)	770 (734–871)	-309 (-402– -178)	<0.01	0.85
Transportation									
Duration of transit (sec)	86 (83–107)	98 (84–102)	+4 (-3–13)	0.87	101 (67–142)	100 (88–103)	-7 (-40–35)	0.80	0.90
Duration of transit (% of total simulation duration)	8.9% (7.1%–9.9%)	12.4% (10.9%–17.9%)	+5.1% (4.3%–6.7%)	0.04	9.1% (6.6%–11.4%)	12.5% (11.4%–13.3%)	+3.9% (0.8%–6.7%)	0.05	0.35
Transportation speed (mph for 250ft transport)	2.0 (1.6–2.1)	1.7 (1.7–2.0)	-0.1 (-0.3–0.0)	0.84	1.7 (1.2–2.6)	1.7 (1.7–1.9)	+0.1 (-0.9–0.4)	0.82	0.97
In-transit Chest Compression									
Proportion of compressions with proper hand position	1.00 (1.00–1.00)	1.00 (1.00–1.00)	0.00 (0.0–0.0)	1	1.00 (1.00–1.00)	1.00 (1.00–1.00)	0.00 (0.0–0.0)	1	1
Compression depth (mm; [>50 mm])	25 (24–31)	30 (28–35)	+4 (0–11)	0.39	25 (23–31)	47 (44–50)	+19 (15–26)	<0.01	<0.01
Compressions delivered per minute (cpm; [>100 cpm])	81 (80–90)	81 (69–102)	0 (-10–28)	0.87	68 (26–100)	101 (98–102)	+34 (-3–74)	0.09	0.13
Chest release to <1cm from starting position (%; [100%])	99% (91%–99%)	95% (86%–99%)	-1% (-7%–0%)	0.37	99% (54%–100%)	100% (100%–100%)	+1% (0%–46%)	0.05	0.03
In-transit resuscitation proportion without any compressions	0.00 (0.00–0.19)	0.00 (0.00–0.00)	0.00 (-0.19–0.00)	0.49	0.11 (0.00–0.46)	0.00 (0.00–0.00)	-0.11 (-0.46–0.00)	0.02	0.13
In-transit resuscitation proportion without adequate compressions	1.00 (1.00–1.00)	1.00 (1.00–1.00)	0.00 (0.00–0.00)	0.71	1.00 (1.00–1.00)	0.96 (0.25–1.00)	-0.04 (-0.75–0.00)	0.11	0.11
In-transit Pulmonary Ventilation									
Minute ventilation volume (mL/min)	347 (0–1,459)	173 (0–702)	0 (-904–0)	0.71	117 (0–1,052)	3,670 (3,000–3,900)	+2,893 (2,120–3,670)	<0.01	<0.01
• Ventilation rate (bpm)	1.3 (0.0–3.9)	0.4 (0.0–2.8)	-0.0 (-1.6–0.0)	0.60	0.5 (0.0–2.7)	12.2 (11.9–12.5)	+11.3 (9.5–12.1)	<0.01	<0.01
• Ventilation volume (mL)	275 (0–400)	75 (0–434)	0 (0–100)	0.90	125 (0–390)	300 (250–325)	+75 (-52–269)	0.38	0.74

[Ψ]Mann-Whitney U test [λ]American Heart Association Basic Life Support and Advanced Life Support guidelines

Key: bpm = breaths per minute; cpm = compressions per minute; CPR = cardiopulmonary resuscitation; ft = feet; min = minute; mL = milliliters; sec = second

and ventilatory task performance during patient transport; repeating the simulation scenario only reduced on-scene time. In contrast, the experimental approach resulted in deeper compressions and increased pulmonary ventilation during the transport phase of care. Additionally, experimental BLS and ALS providers' heart rates did not increase as much as those of control subjects. Taken together, these findings indicate that device-assisted automation of select OHCA resuscitation tasks can improve in-transit performance on common CPR metrics while requiring less exertion of provider teams. This finding is of particular interest as the optimal duration of pre-hospital OCHA scene resuscitation prior to transport is unclear.

In light of the time-critical and error-intolerant nature of successful cardiocerebral resuscitation, the ever-increasing complexity of healthcare, and the steadily expanding scientific insight into human performance, efforts to augment provider capabilities are likely to be beneficial. The experimental OHCA resuscitation approach demonstrated its viability and potential as a mechanism to advance patient care delivery during challenging, transitive periods. Ongoing investigations are attempting to overcome the significant challenges[18] associated with translating these benefits to real-world settings. Further study of the experimental approach for its implications on healthcare work conditions and occupational hazards[19,20] is planned; future application testing may address rural, remote, and/or specialized environments.

Table 3. Comparison of in-transit provider heart rates by study group during first and second simulations.

	Control Group (Standard out-of-hospital cardiac arrest resuscitation protocol and equipment; median and inter-quartile ranges)				**Experimental Group** (Experimental out-of-hospital cardiac arrest resuscitation protocol and equipment; median and inter-quartile ranges)				**Between group p$^{\Psi}$**
Basic Life Support provider (EMT-B; n=10)									
Workload Metric (units)									
Resting heart rate (bpm)	73 (67–76)				77 (67–85)				0.45
Predicted maximal heart rate (mHR; bpm)$^{\omega}$	190 (189–192)				191 (190–191)				0.91
Resting heart rate as percentage of mHR (%)	38.2% (35.4%–42.2%)				40.5% (35.1–44.7)				0.62
	Simulation 1	Simulation 2	Δ	p$^{\Psi}$	Simulation 1	Simulation 2	Δ	p$^{\Psi}$	
In-simulation change in average heart rate during transport (ΔHR from resting heart rate; bpm)	+80.7 (72.9–92.1)	+82.8 (77.8–94.0))	+5.8 (4.6–13.8)	0.49	+64.6 (55.9–83.8)	+57.0 (41.2–63.5)	-9.7 (-20.8–-0.6)	0.24	<0.01$^{\lambda}$
In-simulation average heart rate during transport as percentage of mHR (%)	79.8% (77.7%–86.6%)	83.1% (80.7%–87.2%)	+3.0% (2.4%–7.3%)	0.31	77.2% (66.2%–85.6%)	70.2% (56.9%–77.8%)	-5.1% (-10.9%–-0.3%)	0.31	<0.01$^{\lambda}$
Advanced Life Support provider (EMT-I/C/P n=10)									
Workload Metric (units)									
Resting heart rate (bpm)	70 (62–81)				75 (70–79)				0.67
Predicted maximal heart rate (mHR; bpm)$^{\omega}$	185 (177–188)				186 (184–189)				0.47
Resting heart rate as percentage of mHR (%)	36.8% (35.5%–44.0%)				39.6% (36.9–43.2)				0.76
	Simulation 1	Simulation 2	Δ	p$^{\Psi}$	Simulation 1	Simulation 2	Δ	p$^{\Psi}$	
In-simulation change in average heart rate during transport (ΔHR from resting heart rate; bpm)	+66.7 (53.0–83.1)	+67.8 (52.5–76.1)	+0.3 (-9.7–4.3)	0.94	+73.2 (52.9–76.1)	+43.4 (38.2–68.3)	-23.6 (-29.4–-11.3)	0.04	0.02$^{\lambda}$
In-simulation average heart rate during transport as percentage of mHR (%)	77.3% (73.9%–80.1%)	72.3% (70.1%–82.1%)	+0.2% (-5.3%–2.6%)	0.71	76.1% (70.6%–85.4%)	67.0% (62.8%–74.1%)	-12.3% (-16.0%–-6.1%)	0.02	0.02$^{\lambda}$

$^{\Psi}$Mann-Whitney U test $^{\omega}$Predicted maximum heart rate = 208 – (0.7 × age) using Tanaka formula [14]

$^{\lambda}$Between-simulation ΔHR or Δ%mHR by group (Δ[Δ]) Key: bpm = beats per minute; HR = heart rate

LIMITATIONS

The research program budget and difficulties with subject recruitment limited the sample size, which resulted in a failure of randomization for ALS providers' levels of clinical experience. Healthy, young subjects were studied as impromptu two-provider teams without shared work backgrounds. The accuracy of HR data extraction by OPR is unknown. The simulation method and HR monitoring setup may have acted as confounders when studying subject performance and exertion; the ability of study findings to be translated to live settings is unknown. Provider performance and exertion were not evaluated inside EMS vehicles.

CONCLUSION

An experimental SCA resuscitation approach with task-automating devices improved the in-simulation quality of select in-transit task performance and reduced EMS provider exertion.

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Authors

Leo Kobayashi, MD, Director of Research and Innovation, Lifespan Medical Simulation Center;Professor of Emergency Medicine, Alpert Medical School of Brown University.

Nicholas Asselin, DO, MS, Director of Senior Resident EMS Education, Department of Emergency Medicine; Assistant Professor of Emergency Medicine, Clinician Educator, Alpert Medical School of Brown University.

Bryan Choi, MD, MPH, Division of EMS, Department of Emergency Medicine; Assistant Professor of Emergency Medicine, Alpert Medical School of Brown University.

Max Dannecker, NREMT, Lead Simulation Technician, Seattle Children's Hospital.

Kenneth A. Williams, MD, FACEP, FAEMS, Director, Division of EMS, Department of Emergency Medicine; Professor of Emergency Medicine, Alpert Medical School of Brown University; RI Department of Health Center for EMS Medical Director.

Correspondence

Leo Kobayashi, MD
Lifespan Medical Simulation Center
1 Hoppin St.
Providence, RI 02903
401-444-6237
LKobayashi@Lifespan.org

Pilot Study of the Effect of a Protocol of 30 Minutes of Scene Care in Out-of-Hospital Cardiac Arrest in Rhode Island

JONATHAN THORNDIKE, MD; CARLIN CHUCK, NREMT; JANETTE BAIRD, PHD; NICHOLAS ASSELIN, DO, MS

ABSTRACT

BACKGROUND: Improved outcomes in out-of-hospital cardiac arrest (OHCA) have been demonstrated with increased focus on high-quality CPR. In 2017, the RI Department of Health mandated 30 minutes of on-scene CPR for atraumatic cardiac arrest victims. The effects of this intervention are unknown.

METHODS: An EMR query was performed to identify OHCA cases presenting to a Lifespan hospital during the months of March 2016 (pre-intervention) and March 2017 (post-intervention) with an estimated severity index of 1 or cardiac arrest.

PRIMARY RESULTS: 63 cases of OHCA were identified. ROSC at ED presentation increased in the post-intervention period, though it was not statistically significant (12% vs 22%, CI = -0.01,0.25 vs. 0.09,0.35). Endotracheal intubation and ACLS medication use increased as well.

CONCLUSIONS: This pilot study of a protocol emphasizing on-scene CPR in urban Rhode Island resulted in changes in pre-hospital OHCA management and there was a trend toward increased ROSC in the post-intervention period.

KEYWORDS: Cardiac Arrest, Emergency Medical Services, ROSC

INTRODUCTION

Over the past 10 years, studies focusing on the provision of pit-crew style "high-quality CPR" have suggested that there are significant benefits from "high-quality CPR," compared with traditional CPR among patients with out-of-hospital cardiac arrest (OHCA). These benefits include increased survival to admission and hospital discharge, as well as improved neurologic function at discharge.[1,2] Focus on the provision of "high-quality CPR" is predicated on the idea that initial on-scene resuscitation eliminates potential degradation in CPR quality due to patient moving, transport, packaging, and other factors. These studies have mostly been conducted in high-functioning emergency medical service (EMS) systems with aggressive medical control and leadership, central organization and a high proportion of paramedic-level EMS personnel. Rhode Island EMS providers are predominantly "EMT-Cardiac" level, which is a designation unique to Rhode Island and typically permits all BLS-level interventions, as well as ACLS medications and airway techniques, see **Table 1** for EMS scope of practice in OHCA. Additionally, prior studies have been confounded by increased rates of cardiac catheterization, new advanced airway equipment, hospital triage, and other changes.

Table 1. Comparison of Rhode Island EMS scope of practice in OHCA.

Intervention	EMT Basic	AEMT - Cardiac	Paramedic
Airway	Bag Valve Mask	Bag Valve Mask	Bag Valve Mask
	Supraglottic Airway	Supraglottic Airway	Supraglottic Airway
		Endotracheal Intubation	Endotracheal Intubation
Vascular Access	None	Intraosseous	Intraosseous
		Intravenous	Intravenous
Medications	No ACLS	Basic ACLS:	Basic ACLS plus:
		Epinephrine	Magnesium
		Lidocaine	Vasopressors
		Amiodarone	Procainamide, etc
Electrical Therapy	Automated External Defibrillation	Manual Defibrillation	Manual Defibrillation

Seeking to improve outcomes from OHCA, in March of 2017, the Rhode Island Department of Health instituted new protocols requiring EMS providers to stay on the scene of an atraumatic cardiac arrest for 30 minutes, or until return of spontaneous circulation (ROSC) was achieved.[3] Traditionally, EMS providers have been taught to transport OHCA patients to hospitals quickly, so mandating them to remain on scene for up to 30 minutes is controversial. According to the American Heart Association (AHA), approximately 355,000 people each year suffer an OHCA event (110 events per 100,000 population). Studies vary, but the overall survival rate for OHCA is anywhere from 6-12%[4,5] nationally. Extrapolating these statistics to Rhode Island's population of 1 million, an estimated 1,100 Rhode Islanders are having OHCA each year, or 3 people every day.

Based on prior research demonstrating improved outcomes after the implementation of protocols centered on high-quality CPR, we hypothesized that an increased rate of ROSC at presentation to the ER would be seen after similar protocols were established in Rhode Island. We expected high compliance with mandatory 30-minute on-scene CPR, as well as increased use of medications and advanced airway techniques.

STUDY DESIGN AND METHODS

This study was conducted at Lifespan affiliate hospitals in Rhode Island: Rhode Island Hospital (a tertiary-level, academic hospital), The Miriam Hospital, and Newport Hospital. New CPR protocols were instituted in March of 2017. To evaluate these protocols, OHCA patients were identified via electronic medical record query. Period 1 was chosen as March 2016, approximately 1 year prior to the institution of new CPR protocols. Period 2 was chosen as March 2017, the first month after institution of new CPR protocols. The same month pre- and post-intervention was chosen to help limit the seasonal variability of ER presentations. The study protocol was approved by the institutional review board.

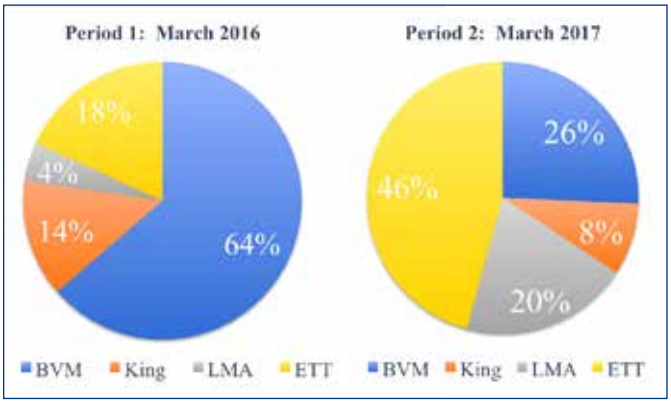
Inclusion criteria for brief chart review included: estimated severity index[6] of 1, or chief complaints of "ventricular fibrillation", "VF", "cardiac arrest", "CPR", and "code blue." Exclusion criteria included age <18, pregnant patients, prisoners, and transfers. Patients who had OHCA while en route to the hospital were also excluded, as were post-arrest transfers from other facilities. The initial EMR query identified 214 patients. These charts were reviewed by one of the authors (JT). Based on the EMS report, and ED physician and nursing notes, those records deemed to be due to non-cardiac causes were then excluded, such as stroke, trauma, primary respiratory arrest, and overdose. When unclear, the patients were assumed to be cardiac in etiology. Post-mortem reports, inpatient notes, discharge summaries and other inpatient data were not reviewed. After exclusion of non-OHCA patients, the total number of patients in period 1 was 25 and period 2 was 38.

These OHCA charts (n=63) were then reviewed further and data was abstracted, including EMS run sheet narratives and timestamps, EMS provider level (EMT-B, "cardiac" or paramedic), EMS agency distance from hospital (median EMS station distance to hospital), patient demographics and comorbidities, use of automated CPR devices, airway management methods, duration of CPR, patient cardiopulmonary status at presentation to the ER, return of spontaneous circulation (ROSC), patient disposition (to ICU, catheterization lab, morgue, etc.), and ER length of stay. The primary outcome for the study was ROSC at presentation to the ER, i.e., if the patient had a pulse upon arrival to the ER after receiving treatment by EMS providers. Whether the patient received less than 30 minutes by EMS, or greater than or equal to 30 minutes of CPR was coded in a binary fashion. Data were analyzed by the new CPR protocol periods (period 1 = pre, period 2 = post). Data are reported descriptively as counts or percentages with the appropriate 95% confidence intervals (CI) calculated.

RESULTS

63 total patients had a complete chart review performed (**Figure 1**). Average age was 64 years, and 58% of the patients were male. 15 patients received bystander CPR. CPR devices were commonplace, having been used in nearly half of resuscitations with data available. Initial shockable rhythms occurred in 18 of 58 cases with complete data. EMS was dispatched to a patient's home in 68% of cases. 81% of patient EMR charts had EMS charts scanned-in and available for review.

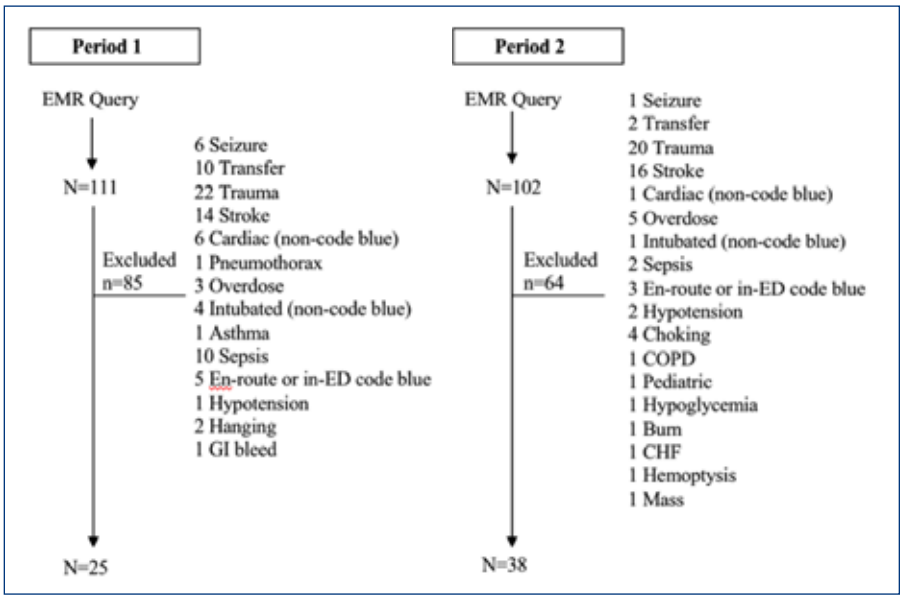
Figure 1. Comparison of prehospital airway use between the two study periods. Bag Valve Mask (BVM), King LT (King), Laryngeal Mask Airway (LMA), Endotracheal Tube (ETT).



11 of these patients had ROSC at presentation to the ER. 3 of these patients were in period 1, while 8 of them were in period 2, though this difference in ROSC was not statistically significant (12% vs 22%, CI = -0.01,0.25 vs. 0.09,0.35). In period 1, none of the patients received 30 minutes of CPR, while in period 2, 19 of 37 patients received 30 minutes of CPR.

Airway use changed dramatically between the time periods (**Figure 2**). The majority of EMS airway management consisted of bag-valve mask (BVM) use in period 1 (14 of 22) while endotracheal tubes were significantly more common in period 2 (16 of 36). EMS attempted intubation in 10 cases in period 1, and were successful in 4 cases (40% success rate; 95%CI: 21, 59), while in period 2, intubation was attempted in 23 cases and successful in 16 (70% success rate; 95%CI: 55, 85). Medication use was also altered; the median milligrams (mg) of epinephrine in period 1 was 2mg, while it increased to 5mg in period 2; with some patients receiving as much as 12mg of epinephrine.

Figure 2. Inclusions and exclusions for both study periods.



All patients who had ROSC at presentation to the ER (n=11) survived to admission to the hospital. Most commonly, patients were admitted to the MICU (n=6), followed by the CCU (n=4). Notably, there was an additional cohort of patients who did not have ROSC at presentation to the ER, but did survive to admission (n=8); 5 of these 8 patients were in period 1, and 2 of the 3 patients who had no ROSC at presentation to the ED but did survive to admission had ROSC for EMS but had lost a pulse upon presentation to the ER.

DISCUSSION

This is the first study on the new CPR protocols in Rhode Island. More broadly, prior studies on "high-quality" CPR have studied CPR bundled with other interventions, such as increased triage to PCI centers, have simultaneously implemented rigorous CPR training for first responders and EMS providers, and have been confounded by additional interventions, such as the implementation of new airway equipment. However, these studies have reported improved outcomes including better neurologic outcome at discharge and higher rates of ROSC.[1,2,7-13] These studies have also been in high-functioning EMS systems with rigorous medical control and a high proportion of paramedic-level EMS providers. It is important to note that our study is limited by lack of control for patient arrest characteristics, age and comorbidities, provider level, and other factors.

This observational, retrospective pilot study reported outcomes from 63 patients suffering from OHCA treated by 16 different departments with predominantly EMT-Cardiac level providers. While the number of patient cases of OHCA was relatively limited in this study, and its retrospective nature gives rise to several limitations, we did observe trends in management. Over the study period, there was an increase in the number of patients receiving 30 minutes of CPR in compliance with the new RI Department of Health protocols, an increase in the use of advanced airways and increase in the amount of medications patients received.

With respect to airway management, supra-glottic devices and endotracheal tubes were more common in period 2 than period 1. This likely owes to the fact that EMS providers feel that bag valve mask ventilation of patients for 30 minutes is inferior to advanced airway devices and may be difficult with vomiting or the effort required for a good face-mask seal for the entire 30 minutes. Prior literature has suggested that patients with advanced airways, conversely, have worse outcomes. For example, in one retrospective cardiac arrest database, among 10,691 OHCA patients, survival was highest among patients treated with BVM compared with other devices (OR1.31).[7] While this may indicate that patients who were more likely to have a good outcome did not require placement of an advanced airway, such as those who woke up immediately after defibrillation and therefore did not require additional airway management, it is also possible that increased focus on patient airways may have taken focus and time away from CPR. Studies have shown that pre-hospital providers sometimes pause compressions for intubation; one study found a median pause of 109 seconds.[8] Research has found pauses in CPR to be deleterious – one recent study of 319 defibrillator OHCA cases, showed that increasing peri-shock pause was associated with decreased survival.[9] Though more patient intubations were attempted during period 2 than period 1, we cannot comment on success rates of intubation given the small n, though success rates of pre-hospital intubation have been cited as anywhere between 60 and 93%.[10]

During pre-hospital codes, patients received a variety of medications, including epinephrine, naloxone, sodium bicarbonate, and glucose. One patient received as much as 12mg of epinephrine, which is of questionable utility. Prior studies have shown that epinephrine use during cardiac arrest is associated with increased rates of ROSC, though may ultimately worsen outcomes.[9-12] In these studies, patients receiving over 5mg of epinephrine had the lowest odds of survival (OR 0.23), relative to patients who did not receive epinephrine. This retrospective study is also subject to similar confounding – that is, that patients receiving more epinephrine had been pulseless for a longer period of time, which is certainly associated with a worse prognosis.

LIMITATIONS

The study was limited by the fact that EMS agencies in Rhode Island began using the new CPR protocols at different time periods. This study was retrospective and may not account for confounders such as EMS training, new equipment and apparatus, although there was no system-wide institution of new protocols and procedures, as there has been in past studies. EMS chart availability was not uniform, which may also bias results. EMS providers are supposed to submit their reports for scan into the EMR, which does not reliably occur. Finally, researchers may have mis-categorized patients as victims of OHCA (or excluded them as non-OHCA patients) who were suffering from respiratory arrest, overdose or another process. While the treatment for OHCA and pulseless arrest is CPR, a primary process other than cardiogenic OHCA, such as overdose, might call for higher prioritization of other treatments, such as administration of naloxone or a secure airway. Patients suffering from respiratory arrest-induced OHCA could have worse outcomes when treated with "high-quality CPR" than patients with VF-induced OHCA, though this has not been studied.

CONCLUSIONS

Overall, we found that EMS agencies are complying with 30-minute CPR protocols. More patients had ROSC at presentation to the ER and survived to admission in period 2, post-intervention, than did in period 1, though this difference was not statistically significant. Future directions for the project include abstraction of more data, including expanding periods 1 and 2 to include >1 year of data, as well as case-matching patients to more definitively determine the effects of CPR duration on patient outcomes at presentation, as well as neurologic function at discharge.

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Authors

Jonathan Thorndike, MD, PGY-4, Brown University Residency in Emergency Medicine.

Carlin Chuck, NREMT, Brown University and Brown University EMS.

Janette Baird, PhD, Associate Professor of Emergency Medicine (Research), Alpert Medical School of Brown University.

Nicholas Asselin, DO, MS, Director of Senior Resident EMS Education, Assistant Professor of Emergency Medicine, Clinician Education, Alpert Medical School of Brown University.

Correspondence

Jonathan Thorndike, MD
Brown Emergency Medicine Residency
55 Claverick Street, Suite 100, Providence RI, 02903
401-444-5826
Jonathan.thorndike@lifespan.org

Case Report: Intact Survival Following Prolonged Out-of-Hospital Cardiac Arrest Care

JOSEPH LAURO, MD, FACEP; DAVID LINDQUIST, MD; EVAN KATZ, AEMT-C; NICHOLAS ASSELIN, DO, MS

KEYWORDS: Cardiac Arrest, Emergency Medical Services, Systems of Care

CASE REPORT

A 57-year-old woman with a past medical history of diabetes, was found lying in bed and apneic by her partner, who activated 911. No bystander CPR was performed. An ambulance with two EMS providers, and a fire engine with three EMS providers, arrived on scene within 4 minutes of initial dispatch. The patient was found pulseless and apneic. Continuous manual compressions were performed by a single responder until a mechanical compression device was attached to the patient. The patient's airway was initially secured with an oropharyngeal airway (OPA) and ventilations administered via a bag-valve mask. The first electrocardiogram detected pulseless electrical activity. The OPA was removed in favor of successful placement of a laryngeal mask airway (LMA). Bag-valve ventilations were continued with high-flow oxygen.

After an unsuccessful IV attempt, an intraosseous (IO) device was used to establish access in the right humeral head and 1 milligram of epinephrine 1;10,000 was administered via IO push. A full cycle of CPR was performed and a second rhythm check detected ventricular fibrillation. A shock was delivered at 120 joules, bi-phasic, and an additional milligram of epinephrine was administered via IO push. The third rhythm check showed ventricular fibrillation and an additional shock was delivered at 150 joules, bi-phasic. Epinephrine and CPR were continued per ACLS protocols.

After 30 minutes of unsuccessful on-scene resuscitation EMS crews moved the patient via bag stretcher while the mechanical compression device continued chest compressions. EMS crews transferred care to emergency department personnel with CPR in progress 42 minutes after initial patient contact.

Upon arrival to the ED, the patient was without spontaneous respirations, and remained pulseless. Her pupils were fixed and dilated. The patient was intubated via direct laryngoscopy. The patient was noted to have a wide complex tachycardia without pulses. Defibrillation was attempted but unsuccessful. CPR was continued while the patient received lidocaine 100 mg, calcium gluconate 1g, insulin 10 units IV, and D50 IV. Amiodarone was subsequently administered, along with magnesium sulfate 1g IV. Return of spontaneous circulation (ROSC) was achieved but subsequently lost approximately 63 minutes after initial EMS-patient contact. CPR was continued and the patient was next started on dopamine followed by norepinephrine. ROSC was re-achieved.

The patient's initial EKG showed a wide complex junctional rhythm with a rate of 75. Subsequent EKGs demonstrated a sinus tachycardia with a narrowed QRS complex and a RBBB. A bedside echocardiogram demonstrated no significant wall motion abnormality, no RV dilation, no pericardial effusion, and no evidence of pulmonary hypertension. A chest x-ray confirmed endotracheal tube placement and demonstrated pulmonary edema. Initial laboratory studies revealed an elevated creatinine (1.78 mg/dl) and glucose (485 mg/dl), and an anion gap of 19. The patient's wbc was 14,000, with 7% bandemia.

Additional history from the family revealed a prior hospital presentation for hypercalcemia, a recent thyroidectomy, and concern for parathyroid complications. The family also reported that the patient had been experiencing 2-3 days of severe diarrhea. Due to the severity of illness and recent surgical history, the patient was transferred to a tertiary care center via a critical care transport team.

During transport and at the tertiary care center, the patient became more alert, requiring sedation and analgesia, while the patient's blood pressure was tenuous and she received push-dose administration of epinephrine and titration of vasopressors. A CT scan of the chest and abdomen was negative for pulmonary embolism, but did demonstrate several rib fractures and a Thoracic vertebral fracture. Laboratory studies revealed mild hypokalemia and hypercalcemia. The patient was transferred to the Intensive Care Unit. A subsequent MRI did not show any cord signal abnormality.

DISCUSSION

High quality CPR encompasses five key components: Minimizing interruptions in chest compressions, providing compressions of adequate rate and depth, avoiding leaning on the chest between compressions and avoiding excessive ventilation. A recent study[1] comparing on scene to transport chest compressions revealed that compressions during transport are significantly worse than on scene compressions. In an effort to enhance prehospital resuscitative efforts and improve survival from out-of-hospital cardiac arrest (OHCA) the RI Department of Health, Center for EMS, in conjunction with the RI Ambulance Service Advisory Board, updated the cardiac arrest protocol reflecting these priorities.

In March 2017 the RI Department of Health released new protocols[2] requiring EMS providers to remain on scene for

30 minutes for both witnessed and unwitnessed OHCA. This was prompted by the evidence supporting worsened outcomes with interruptions in compressions[3] which are associated with a decrease in coronary and cerebral perfusion pressures requiring up to a minute of continuous compressions to achieve sufficient perfusion pressures. By remaining on scene, EMS providers are able to focus on resuscitative efforts such as early epinephrine administration, airway management and most importantly, minimally interrupted CPR as opposed to focusing on packaging and transporting the patient to the hospital. The duration of scene time was determined through a literature search, showing cases of successful OHCA management with ROSC after long field resuscitation.[4]

As part of ongoing quality improvement efforts, data were collected (some presented in this journal) to better understand the impact of the RI EMS Protocol changes.[5] Prior to these protocol changes, standard practice was to "scoop and run" with OHCA patients. This generated some resistance to remaining on scene for an extended time, largely based upon the potential for increased resource utilization and need for mutual aid in busy systems. Public perception surrounding OHCA care was likely a major factor in this as well.

During the implementation phase excessive attention remained on the actual time on scene; however, as EMS providers became more comfortable with the protocol, the focus shifted to strategies to minimize interruptions in compressions and deliver high quality CPR. This "pit crew" approach to OHCA,[6] adopted in numerous EMS systems nationally, where providers treat patients aggressively at the site of collapse, has been associated with improved patient outcomes and increased rates of ROSC.[6-8]

Public and provider education, engagement of major stakeholders and engaged medical direction are key factors in implementation of protocols such as the "30-minute CPR protocol." As we move forward and collect prospective data we anticipate that a specific time requirement on scene may be enhanced by a protocol to resuscitate most OHCA on scene until ROSC or futility is achieved.

CASE CONCLUSION

In the MICU the patient was weaned from vasopressors and was eventually extubated on hospital day 5, and placed in a brace for her spinal fracture. She required extensive Physical and Occupational Therapy, and was discharged on hospital day 25 to a skilled nursing facility. At the time of discharge, she was noted to have some mild cognitive deficits versus delirium of hospitalization. She was evaluated by cardiology and felt not to be a candidate for Automated Implantable Cardioverter Defibrillator placement, as there was little evidence her cardiac arrest was cardiogenic in nature. Based upon her most recent visits, we infer her Pittsburgh Cerebral Performance Category[9] (CPC) to be 2 – *Moderate disability but independent in activities of daily living.*

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Authors

Joseph Lauro, MD, FACEP, EMS Medical Director, Miriam and Newport Hospitals; Clinical Associate Professor of Emergency Medicine, Alpert Medical School of Brown University; Associate Medical Director, Cumberland Paramedics.

David Lindquist, MD, Director of Teamwork Training, Lifespan Medical Simulation Center; Associate Professor of Emergency Medicine, Clinician Educator, Alpert Medical School of Brown University.

Evan Katz, AEMT-Cardiac, Newport Fire Department.

Nicholas Asselin, DO, MS, Director of Senior Resident EMS Education, Brown Emergency Medicine; Assistant Professor of Emergency Medicine, Clinician Educator, Alpert Medical School of Brown University.

Correspondence

Joseph Lauro, MD, FACEP
EMS Division, Brown Emergency Medicine
55 Claverick Street, Suite 100, Providence, RI 02903
401-444-5826
joseph.lauro@brownphysicians.org

Pediatric Out-of-Hospital Cardiac Arrest in Rhode Island: Concepts and Controversies

TANYA SUTCLIFFE, MD; NICHOLAS ASSELIN, DO, MS; LINDA BROWN, MD, MSCE

ABSTRACT

Pediatric out-of-hospital cardiac arrest (POHCA) is an infrequently encountered event by emergency medical providers, both across Rhode Island and nationally. The etiologies of these events differ from those in adult cardiac arrests and overall outcomes remain poor. The skills required by emergency medical providers to care for these patients are performed and practiced infrequently. Pediatric patients are also at further risk of serious adverse events secondary to challenges with airway management and variation in equipment sizing and weight-based medication dosing. Recent changes to Rhode Island Emergency Medical Services protocols, particularly the requirement for all non-traumatic cardiac arrests to be managed on scene for a minimum of 30 minutes, have led to discussion and controversy. As we aim to improve the quality of care delivered during these resuscitations through education, research and collaborative protocol development, it is important to recognize and remain focused on the unique aspects of these pediatric patients.

KEYWORDS: Pediatrics, Cardiac Arrest, Emergency Medical Services

INTRODUCTION

Pediatric out-of-hospital cardiac arrests make up less than 10% of Emergency Medical Service (EMS) resuscitations in the field and are often associated with poor outcomes.[1] Adult literature for out-of-hospital cardiac arrests (OHCA) has demonstrated improvement in outcomes following longer durations of cardiopulmonary resuscitation (CPR) prior to transport.[2] This approach stems from an understanding that, in adults, high-quality and minimally-interrupted CPR and early defibrillation are the key to improved survival. As a result, some EMS systems have altered protocols to encourage aggressive on-scene resuscitation in cases of adult OHCA. This approach has been recently been applied to the pediatric population and, in the updated 2017 Rhode Island EMS protocols, 30 minutes of on-scene CPR for POHCA was endorsed. This change has resulted in further discussion and some controversy, given the heterogeneity of pediatric patients and the differences in the pathophysiology of pediatric and adult cardiac arrests. In this article, we aim to examine the relevant literature and discuss the potential controversies that exist in the prehospital management of POHCA.

The American Heart Association (AHA) recently released new statistics reporting an annual incidence of EMS-assessed POHCA of approximately 7,000 cases compared to nearly 340,000 in adults.[3] With these relatively low numbers, despite medical advances and efforts to increase training in pediatric resuscitation, POHCA events have continued poor neurologically-intact survival rates. This is in stark contrast to increases in survival outcomes from pediatric in-hospital cardiac arrests, where data from the Get With the Guidelines-Resuscitation registry reported a nearly threefold improvement from 2000–2009 with no worsening in neurologic outcomes.[4]

While there is a steadily growing body of literature regarding POHCA, it remains limited when compared to adult studies. Most published studies are retrospective and observational in nature, while some include the extrapolation of more robust adult data to the pediatric population. [5] The primarily cardiac etiology and larger numbers of adult arrests makes these events easier to study and therefore protocolize, whereas the etiology of pediatric arrests varies based on age, pathophysiology, and mechanism, resulting in more complicated and variable management for medical providers.

Rhode Island is unique given its small geographic size, with a population of only 1,059,639 according to 2016–2017 estimates. Children under 18 years of age make up 19.7% of the population. There are currently 87 licensed EMS agencies in RI with 4,779 licensed practitioners and in 2017 there were 183,902 documented EMS calls reported. Due to its geography, most areas of Rhode Island have short transport times to the closest emergency department. However, there is only a single Level 1 Pediatric Trauma Center, which can be distant from more rural areas. This information must be considered when determining optimal EMS protocols.

POHCA ETIOLOGY

One of the factors complicating improvement in POHCA care may be the variable etiology of these arrests. The most common causes of POHCA's are trauma, sudden infant death syndrome (SIDS), respiratory disease and submersion.[6-8] The majority of cardiac rhythms found in the field are asystole

and PEA, with shockable rhythms making up less than 10% of pediatric arrests. This is significant and likely affects neurologically-intact survival rates, as evidence demonstrates that the presence of a shockable rhythm, such as ventricular fibrillation or ventricular tachycardia, on initial evaluation is associated with improved outcomes in children and adults.[6-9]

The majority of pediatric out-of-hospital cardiac arrests occur in children under the age of five years, with patients less than one year of age making up nearly half of these events.[10] SIDS is a common cause in this age group and etiology can often not be determined. However, many experts suspect there is a respiratory component given the decline in infant deaths following the Back-to-Sleep movement.[11] Pediatric arrests in the less than one-month age group in particular have further considerations due to the higher risk of sepsis, undiagnosed congenital heart defects, inborn errors of metabolism and increased vulnerability to respiratory illnesses.[3,11] As such, particularly in the infant age group, it may be difficult to immediately elucidate the cause of cardiac arrests in the field, and therefore the approach to these arrests may be more difficult to protocolize.

PEDIATRIC RESUSCITATION CHALLENGES IN THE FIELD

Other challenges unique to pediatrics can occur during resuscitations in the field. While the new EMS protocols exclude trauma in their 30-minute on-scene CPR recommendations, external findings of non-accidental trauma can be subtle or non-existent, such as in cases of abusive head trauma. This leaves a significant population at risk and could lead to delays in identification and initiation of appropriate care.

Along with more subtle clinical findings, procedures in pediatric patients are also complex. Technical variables including equipment sizing and medication dosing, which vary based on patient age and size, often make a difficult situation even more stressful to medical providers and create the potential for adverse safety events.[12] Given the variation in pediatric anatomy, definitive airway management is also often more difficult than in the adult patient. The evidence around the effect of an advanced airway on survival after OHCA is mixed; however, with several studies supporting the use of bag and mask ventilation over endotracheal intubation in the prehospital setting and others refuting this claim.[10,13-15] With any method of airway management, however, prehospital providers have limited training and hands-on experience in pediatric patients. Published data regarding the ability of prehospital providers to manage the pediatric airway reveal that the majority has little or no experience with these critical procedures.[10,16] There is further evidence that pediatric continuing education is limited for many providers, and that rarely utilized pediatric skills, especially those learned outside of the clinical environment, deteriorate quickly.[17-18] This lack of exposure to POHCA, minimal ongoing experience with important management guidelines and procedures, and limited pediatric continuing education can lead to critical delays and errors in care.

PEDIATRIC RESUSCITATION EFFORTS/PEDIATRIC ARREST AND 30-MINUTE CPR IN THE FIELD

In the spring of 2017, Rhode Island updated the state EMS protocols, including updates to the pediatric cardiac arrest protocol. This updated protocol states, "Regardless of proximity to a receiving facility, absent concern for provider safety or a traumatic etiology for cardiac arrest, resuscitative efforts should continue for a minimum of 30 minutes prior to moving the patient to the ambulance or transporting the patient." This change is supported by adult literature that demonstrates improved outcomes for patients 18 years and older receiving 30 minutes of CPR for out-of-hospital cardiac arrests.[2] These improved outcomes are largely felt to be due to the detrimental impact of patient transport on high-quality CPR, along with the primarily cardiac etiology of adult arrests. The pediatric literature is less clear.

As previously stated, outcomes for POHCA in general are poor;[1] Tijssen et al, however, found that pediatric out-of-hospital cardiac arrests had improved outcomes with prehospital CPR times ranging from 10–35 minutes.[19] Banerjee et al found improved neurologic outcomes in early on-scene management of POHCA in a single county after initiation of targeted pediatric training and physiologic-driven procedures with on-scene resuscitation time average approximately 17 minutes.[20] Young et al, however, found no good neurologic outcomes in survivors who received greater than 31 minutes of CPR. A recent large retrospective study in Japan that examined POHCA and CPR duration found favorable 30-day survival with good neurologic outcome occurred in <1% of patients who received prehospital CPR of 42 minutes duration or longer. It is notable that this study only looked at ROSC obtained in the field, excluding the analysis of over 80% of POHCA in which ROSC was not obtained. In addition, epinephrine was administered less than 50% of the time in those POHCA in which ROSC was obtained, which does not follow standard protocols in the US.[6] As such, it is possible that the extrapolation of an adult protocol to the pediatric population may result in unintended harm by potentially delaying access to more definitive care by focusing only on the aspect of prolonged scene time and not on pediatric specific resuscitation training and high-quality CPR.

Discussion of length of on-scene resuscitation for pediatric cardiac arrest creates a paradox, where one group of POHCA patients, such as older children and adolescents who have anatomical and physiologic similarities to adult patients, may benefit from prolonged on-scene resuscitation, while another, younger children and infants, may not. It is without question that the delivery of high-quality CPR is the primary

factor in improving survival from cardiac arrest and education and training around this is critical. Other interventions that have been reported to increase survival from out of hospital cardiac arrest, and should be considered for use across Rhode Island include, dispatcher-assisted CPR, "pit-crew" approaches to teamwork, and real-time CPR feedback. In particular, RI lacks a system of formalized telecommunicator CPR, a resource which many states use to provide instructions to families over the phone, initiating resuscitation earlier, which can lead to improved outcomes. The challenge is in crafting resuscitation protocols that identify those who will benefit from protocols encouraging aggressive on-scene resuscitation, and those who would not. In Rhode Island, while it may take significant time, the development of a robust registry of POHCA cases may give valuable guidance to policymakers as well as pediatric emergency medicine and EMS physicians.

CONCLUSION

Pediatric out-of-hospital cardiac arrests require prehospital providers to give careful thought to the etiology of the event while simultaneously delivering high quality resuscitative care. Acknowledging this complex process may prove relevant in the discussion around the utility of longer on-scene resuscitative efforts. The relative rarity of these events also highlights the importance of education for prehospital providers on specific skills and knowledge for pediatric patients.

Given the complexities of pediatric out-of-hospital cardiac arrests, and the scarcity of literature currently available on this topic, careful deliberation regarding the protocolizing of pediatric prehospital care must be given. Only through the recognition of the unique qualities of pediatric patients, the continued collaboration between prehospital and pediatric experts, the encouragement of ongoing pediatric specific training, and the call for increased prehospital pediatric-specific research, will we improve the outcomes for all children.

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Authors

Tanya Sutcliffe, MD, Department of Emergency Medicine and Pediatrics; Assistant Professor, Emergency Medicine and Pediatrics, Alpert Medical School of Brown University.

Nicholas Asselin, DO, MS, Director of Senior Resident EMS Education, Department of Emergency Medicine; Assistant Professor of Emergency Medicine, Clinician Educator, Alpert Medical School of Brown University.

Linda Brown, MD, MSCE, Director, Lifespan Medical Simulation Center; Associate Professor of Emergency Medicine and Pediatrics, Alpert Medical School of Brown University.

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Correspondence
Tanya Sutcliffe, MD
Department of Emergency Medicine
55 Claverick St., 2nd Floor
Providence RI 02903
401-444-6237
Fax 401-444-5456
tanya.sutcliffe@brownphysicians.org

Cancers Associated with Overweight or Obesity among Rhode Island Adults, 1995–2016

JUNHIE OH, BDS, MPH; C. KELLY SMITH, MSW

Rhode Island's adult obesity rate is currently 30 percent, up from 17 percent in 2000 and from 10 percent in 1990.[1,2] Being overweight or obese can lead to a large number of health problems, including hypertension, high cholesterol, heart disease, diabetes, osteoarthritis, asthma, sleep apnea, infertility, poorer mental health, body pain, and as many as 13 types of cancers.[3] Epidemiologic evidence has shown strong associations between excess body fat and cancer risk, explained by altering hormonal or inflammatory pathways.[3,4]

To better address the burden of cancers associated with overweight or obesity among Rhode Island adults, the authors assessed statewide overweight- or obesity-associated cancer incidence by sex, cancer type and age group, in 2016 (the most current full year of data available in the central cancer registry), as well as incidence trends between 1995 and 2016.

METHODS

The Rhode Island Cancer Registry (RICR) has collected cancer case reports since October 1986. Since 1995, this effort has been supported in part by the Centers for Disease Control and Prevention National Program of Cancer Registries (CDC NPCR), a federally-mandated program that supports state-based cancer surveillance and sets standards for quality, complete and timely cancer case collection and data management.

Using the RICR data, we extracted invasive malignant primary cancers diagnosed in adults aged 20 years and older, from January 1, 1995 to December 31, 2016. Cancer registries have not routinely and consistently collected indicators of body fatness, throughout the data collection years. However, other sources of information can be used to obtain the proportion of cancer probably caused by overweight or obesity. According to the International Agency of Research on Cancer (IARC), 13 types are defined as "overweight- or obesity-associated" cancers. The scientists in the group reviewed and conducted meta-analyses and pooled analyses with more than a thousand studies. They found solid evidence that being overweight or obese increases the risk for at least 13 types of cancer **[Table 1]**.[3] Of these, two cancers, postmenopausal breast cancer and colorectal cancer, were ***not*** included in this study. This study assessed cancers that affect all adults (≥20 years of age), and calculated age-adjusted incidence rates for 11 types of "overweight- or obesity-associated" cancers, using as denominators the full population at risk. Postmenopausal breast cancer, defined by IARC, is diagnosed in women aged ≥50 years, and its incidence is not directly comparable with other cancers. Colorectal cancer was also excluded to minimize bias by screening and treatment effects. Colorectal cancer rates have steadily decreased among Rhode Islanders for the last two decades, due both to increased screening rates and the early detection and removal of precancerous polyps.[5,6]

SAS v9.4® statistical analytic software (SAS Institute Inc., Cary, NC) was used to summarize and tabulate frequencies by cancer type, diagnosis year (1995–2016), sex and age group (ages at diagnosis in 5-year intervals between 20–79 years, plus the category of ≥80 years). Jointpoint Regression

Table 1. Overweight- or obesity-associated cancers defined by International Agency of Research on Cancer (IARC)*

Cancer site/type	Site [ICD-O-3] §	Histology [ICD-O-3] §
Adenocarcinoma of the esophagus	C15.0–15.9	8140–8575
Gastric cardia	C16.0	8000–9049, 9056–9139, 9141–9589
Colon and rectum†	C18.0–20.9, C26.0	
Liver	C22.0	
Gallbladder	C23.9	
Pancreas	C25.0–25.9	
Multiple Myeloma	C42.1	9732
Postmenopausal breast (female age ≥50 years)†	C50.0–50.9	8000–9049, 9056–9139, 9141–9589
Corpus Uterus & Uterus NOS	C54.0–54.9. C55.9	
Ovary	C56.9	
Kidney	C64.9	
Meningioma	C70.0–70.1, C70.9	9530–9539
Thyroid	C73.9	8000–9049, 9056–9139, 9141–9589

* IACR used the definitions overweight as a body-mass index (BMI) of 25.0-29.9, and obesity as a BMI of ≥30, among adults.
§ International Classification of Disease for Oncology, 3th edition
† Cancers in colon, rectum, and postmenopausal breast were not included in this study (see Methods).

Analysis software v4.6.0.0 (http://surveillance.cancer.gov/jointpoint/) was used to calculate age-adjusted rates per 100,000 residents using the 2000 US standard population (https://seer.cancer.gov/stdpopulations/), and to assess trends between 1995 and 2016 with statistical significance testing of annual percent change (APC, p-value<0.05). State population estimates for rate denominators were obtained from the National Cancer Institute Surveillance, Epidemiology, and End Results Program (NCI SEER; https://seer.cancer.gov/popdata/download.html).

RESULTS

Current cancer incidence associated with overweight or obesity

In 2016, approximately 1,100 cancers in RI were categorized as overweight- or obesity-associated cancers, accounting for about 20% of the nearly 5,900 cancers diagnosed among Rhode Island adults.

Overweight- or obesity-associated cancer rates were higher among females than males (135 [95% CI:124–145] *vs.* 103 [95% CI:93–113] per 100,000), partly because 40% of these cancers among females occurred in the female genital organs (uterus and ovary). Among adult males, cancers of the kidney (30 per 100,000) and pancreas (22 per 100,000) were the most frequently diagnosed in 2016. In the same year, cancers of the uterus (40 per 100,000) and thyroid (35 per 100,000) were the most frequently diagnosed among females. Kidney cancer was twice as likely to occur in males than in females (30 [95% CI:24–35] *vs.* 15 [95% CI:11–18] per 100,000), and liver cancer incidence among males was three times higher than among females (15 [95% CI:12–19] *vs.* 5 [95% CI: 3–7] per 100,000). However, females had almost triple the rate of thyroid cancer among males (35 [95% CI:29–41 *vs.* 12 [95% CI:8–15] per 100,000). A majority (81%) of cancer diagnosed in females age 20–39 were thyroid cancer, which drove the age-specific rate three times higher than their male counterparts. For both sexes, about 50% of the overweight- or obesity-associated cancers were diagnosed in people 60–79 years of age **[Table 2].**

Table 2. Case counts and age-adjusted rates of selective overweight- or obesity-associated cancers* by sex, age group, and cancer site, among Rhode Island adults ≥20 years, 2016 Rhode Island Cancer Registry

	Male		Female	
	Count	Rate (95% CI) §	Count	Rate (95% CI) §
All	**445**	**103.0 (93.2-112.9)**	**662**	**134.7 (124.0-145.4)**
Age group (years)				
20–39	15	12.4 (6.1–18.8)	53	40.5 (29.4–51.5)
40–59	123	76.6 (62.6–90.5)	207	124.9 (107.3–142.6)
60–79	260	308.0 (269.3–346.6)	322	325.3 (189.1–361.4)
≥80	47	271.6 (199.4–343.8)	80	258.3 (199.5–317.1)
Cancer site/type †				
Kidney	126	29.6 (24.2–35.0)	77	14.8 (11.4–18.1)
Pancreas	90	21.8 (17.1–26.4)	100	18.0 (14.3–21.7)
Liver	71	15.4 (11.7–19.1)	26	5.1 (3.1–7.1)
Thyroid	52	11.8 (8.4–15.1)	144	35.1 (29.1–41.0)
Multiple Myeloma	45	10.4 (7.3–13.6)	27	5.0 (3.1–7.0)
Adenocarcinoma of the Esophagus	33	7.1 (4.6–9.6)	†	†
Gastric cardia	23	5.7 (3.3–8.0)	†	†
Corpus uterus & uterus NOS	n/a		208	39.8 (34.3–45.3)
Ovary	n/a		52	11.0 (7.9–14.1)

* Cancers in the colon, rectum, and postmenopausal breast were not included in this study (see Methods).
§ Rates are per 100,000 and age-adjusted to the 2000 US Population Standard.
† Due to confidentiality and reliability concerns, cancers with <15 cases are not presented.
95% CI = 95% confidence interval

Trend of cancer incidence associated with overweight or obesity

Among males, incidence rates of the overweight- or obesity-associated cancers increased significantly between 1995 and 2003 by 4% annually, but between 2003 to 2016, these rates stabilized. Trends illustrate continuous increases in all age groups between 1995 and 2016, except the oldest (≥80 years). The youngest cohort (20-39 years) showed a sharper gradient of change (APC=5%) than older cohorts (APC=2% among 40-59 years; APC=1% among 60-79 years) **[Table 3].** Among females, the cancer rates increased significantly by about 2% per year between 1995 and 2013. Similar to males, the youngest group of females ages 20-39 years showed a sharper rate of increase than older age groups, from 1995 until 2009 (APC=7%) **[Table 3].**

Trends by cancer site showed kidney cancer among males increased between 1995 and 2007 (APC=4%). Liver cancer's increasing slope was noticeably steeper than other cancers, during the first part of the studied period (APC=9%, 1995–2004). Thyroid cancers steadily increased among males between 1995 and 2016, with a 5% annual increase **[Table 3].** In women, thyroid cancer increased even more sharply (10% per year) than in men and other cancer sites, between 1995 and 2009. Kidney cancer showed a steady increase (APC=2%,

Table 3. Trend* of overweight- or obesity-associated cancer incidence among Rhode Island adults (ages ≥20 years) by sex, age at diagnosis and cancer site, 1995-2016 Rhode Island Cancer Registry

	Statistically Significant Jointpoint Segment*					
	Male			Female		
	Years	Rate changes†	APC	Years	Rate changes†	APC
All§	**1995–2003**	**63.7–101.1**	**4.4%**	**1995–2013**	**105.6–154.9**	**1.9%**
Age group (years)						
20–39	1995–2016	5.9–12.4	5.1%	1995–2009	17.8–60.6	7.4%
40–59	1995–2016	39.0–76.6	2.3%	1995–2007	89.9–147.9	3.6%
60–79	1995–2016	198.3–308.0	1.1%	1995–2016	251.6–325.3	1.0%
Cancer site/type						
Kidney	1995–2007	20.2–34.8	3.5%	1995–2016	9.2–14.8	2.0%
Liver	1995–2004	4.6–17.6	9.4%	Not significant		
Thyroid	1995–2016	4.8–11.8	5.2%	1995–2009	9.2–47.2	10.2%
Corpus uterus & uterus NOS	n/a			1995–2013	38.3–47.9	1.2%
Ovary	n/a			1995–2016	23.2–11.0	-2.1%

* Of different regression models tested by subgroup, presented in the tables are: only the best selected final model and time periods during which trend change was significant.
§ Cancers in the colon, rectum, and postmenopausal breast were not included in this study (see Methods).
† Rates are per 100,000 and age-adjusted to the 2000 US Population Standard.
APC: Annual Percent Change

1995–2016), and uterine cancer increased at a lesser extent until recent years (APC=1%, 1995–2013). By contrast, ovarian cancer decreased significantly between 1995 and 2016 (APC=-2%) **[Table 3].**

DISCUSSION

Through the application of sophisticated trend analysis software, we provide a more complete picture of overweight- and obesity-associated cancer trends in Rhode Island, varied by sex, age group, and cancer type. However, these findings are subject to, but not limited to, the following limitations: (1) individual patient's body fat measurement (such as Body Mass Index) was *not* controlled in this descriptive study; (2) adjustment was *not* made for differential attributable risks by cancer site/type[3]; and (3) additional risk factors may have contributed to the cancers in this study, such as genetic mutations, family history, comorbidity, smoking, alcohol use, and more.

Despite these limitations, a significant portion of cancers among Rhode Islanders is associated with unhealthy body weight, and those cancers have increased with the tripling of obesity during the past generation. In 2016, in addition to the 1,100 cases summarized in this report, 1,200 cases of colon, rectal, and postmenopausal breast cancer were diagnosed. As many as 40% of all newly diagnosed cases of cancer in Rhode Island are those known to be associated with overweight status or obesity, an estimate parallel with the recent U.S. Cancer Statistics representing the national population.[7]

For both sexes in Rhode Island and in the U.S., the steady increase in cancer diagnoses among younger adults is concerning.[8] There is growing evidence of associations between elevated cancer rates and abnormal or excessive body weight in childhood (even at birth) and early adulthood.[8] More studies are needed to determine the role that body weight may play in cancer types, sites, staging and other risk factors among Rhode Island's young adult patients.

Of the cancers in this report, thyroid cancer incidence was three times higher among Rhode Island females than males throughout the study period, though men also experienced a rapid and steady increase of the thyroid cancer, similar to national trends.[9,10] Additional epidemiological research by cancer subtype, tumor size, stage at diagnosis, patients' demographic attributes and survival is needed to identify underlying reasons for the rising rates of thyroid cancer in Rhode Island.

The evidence is clear that obesity increases the risks of a range of chronic conditions. Despite extensive public health campaigns seeking to explain the health risks of excess body weight, public awareness is still low in perceiving obesity as a factor associated with cancer.[7] Rhode Island's cancer control efforts have not yet emphasized obesity control as a means of cancer prevention, like targeting smoking. It is hoped that this assessment will help to guide providers and community partners in implementing weight reduction among other evidence-based cancer control strategies.

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Disclosure

The authors declare no conflict of interest.

Authors

Junhie Oh, BDS, MPH, is the Cancer Registry Administrator and the Senior Public Health Epidemiologist, Rhode Island Department of Health.

C. Kelly Smith, MSW, is the Comprehensive Cancer Control Program Manager, Rhode Island Department of Health, and serves as Adjunct Faculty at Providence College.

Correspondence

Junhie.Oh@health.ri.gov

Rhode Island Monthly Vital Statistics Report
Provisional Occurrence Data from the Division of Vital Records

VITAL EVENTS	REPORTING PERIOD		
	SEPTEMBER 2018	12 MONTHS ENDING WITH SEPTEMBER 2018	
	Number	Number	Rates
Live Births	984	11,588	11.0*
Deaths	840	10,430	9.9*
Infant Deaths	3	67	5.8#
Neonatal Deaths	5	51	4.4#
Marriages	1030	6,671	6.3*
Divorces	254	3,078	2.9*

* Rates per 1,000 estimated population

Rates per 1,000 live births

Underlying Cause of Death Category	REPORTING PERIOD			
	MARCH 2018	12 MONTHS ENDING WITH MARCH 2018		
	Number (a)	Number (a)	Rates (b)	YPLL (c)
Diseases of the Heart	210	2,347	222.0	2,932.0
Malignant Neoplasms	180	2,160	204.3	5,142.5
Cerebrovascular Disease	39	482	45.6	625.0
Injuries (Accident/Suicide/Homicide)	71	889	84.1	12,366.5
COPD	36	517	48.9	467.5.

(a) Cause of death statistics were derived from the underlying cause of death reported by physicians on death certificates.

(b) Rates per 100,000 estimated population of 1,056,298 (www.census.gov)

(c) Years of Potential Life Lost (YPLL).

NOTE: Totals represent vital events, which occurred in Rhode Island for the reporting periods listed above.
Monthly provisional totals should be analyzed with caution because the numbers may be small and subject to seasonal variation.

ADDITIONAL VITAL STATISTICS REPORT

August 2018

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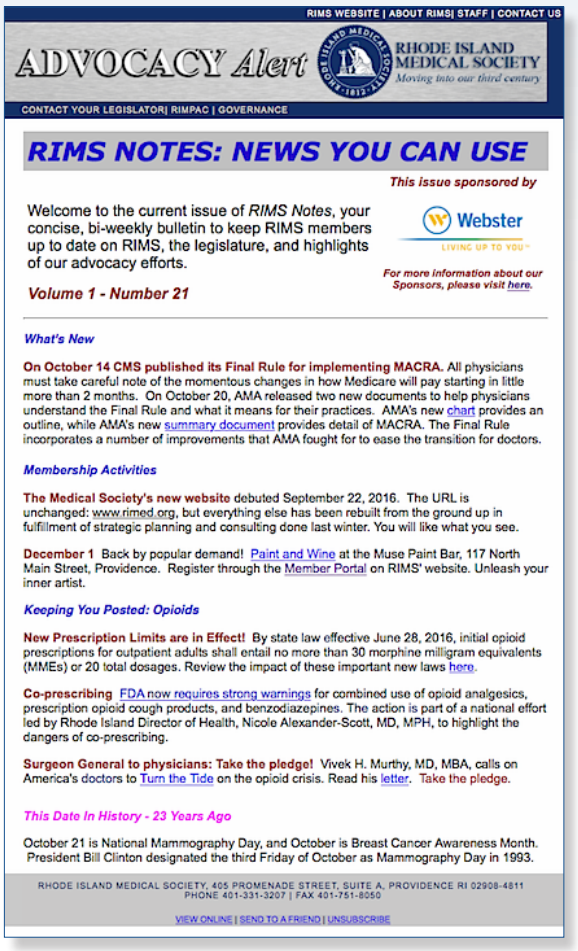

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ADVOCACY Alert — RHODE ISLAND MEDICAL SOCIETY — Moving into our third century

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RIMS NOTES: NEWS YOU CAN USE

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Welcome to the current issue of *RIMS Notes*, your concise, bi-weekly bulletin to keep RIMS members up to date on RIMS, the legislature, and highlights of our advocacy efforts.

For more information about our Sponsors, please visit here.

Volume 1 - Number 21

What's New

On October 14 CMS published its Final Rule for implementing MACRA. All physicians must take careful note of the momentous changes in how Medicare will pay starting in little more than 2 months. On October 20, AMA released two new documents to help physicians understand the Final Rule and what it means for their practices. AMA's new chart provides an outline, while AMA's new summary document provides detail of MACRA. The Final Rule incorporates a number of improvements that AMA fought for to ease the transition for doctors.

Membership Activities

The Medical Society's new website debuted September 22, 2016. The URL is unchanged: www.rimed.org, but everything else has been rebuilt from the ground up in fulfillment of strategic planning and consulting done last winter. You will like what you see.

December 1 Back by popular demand! Paint and Wine at the Muse Paint Bar, 117 North Main Street, Providence. Register through the Member Portal on RIMS' website. Unleash your inner artist.

Keeping You Posted: Opioids

New Prescription Limits are in Effect! By state law effective June 28, 2016, initial opioid prescriptions for outpatient adults shall entail no more than 30 morphine milligram equivalents (MMEs) or 20 total dosages. Review the impact of these important new laws here.

Co-prescribing FDA now requires strong warnings for combined use of opioid analgesics, prescription opioid cough products, and benzodiazepines. The action is part of a national effort led by Rhode Island Director of Health, Nicole Alexander-Scott, MD, MPH, to highlight the dangers of co-prescribing.

Surgeon General to physicians: Take the pledge! Vivek H. Murthy, MD, MBA, calls on America's doctors to Turn the Tide on the opioid crisis. Read his letter. Take the pledge.

This Date In History - 23 Years Ago

October 21 is National Mammography Day, and October is Breast Cancer Awareness Month. President Bill Clinton designated the third Friday of October as Mammography Day in 1993.

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Contact Sarah if you've missed an issue, sstevens@rimed.org.

Working for You: RIMS advocacy activities

April 1, Monday

Meeting with the Department of Health regarding legislation

RIMS Council Meeting: Peter A. Hollmann, MD, President

April 2, Tuesday

RIMS Physician Health Committee: Herbert Rakatansky, MD, Chair

Meeting regarding opioid legislation with Prevent Opioid Abuse

Legislative hearings

April 3, Wednesday

Legislative hearings

Meeting with Senate leadership regarding legislation

Rep. Edwards fundraiser

April 4, Thursday

Meeting with BCBSRI, Peter A. Hollmann, MD, President

Health Professional Loan Repayment Program: Steven R. DeToy, RIMS Director of Government and Public Affairs, Board Member

Legislative hearings

April 5, Friday

Mental Health Parity meeting, Mental Health Association

RIMS Notes issue production

April 9, Tuesday

Legislative hearings

April 10, Wednesday

Board of Medical Licensure and Discipline

Governor's Overdose Prevention and Intervention Task Force: Sarah Fessler, MD, Past President

Legislative hearings

New England Charter Medicine Academy meeting at RIMS: Brad Collins, MD, Immediate Past President

April 11, Thursday

Legislative hearings

SIM Steering Committee: Peter A. Hollmann, MD, President

April 15, Monday

Meeting with RI Dermatology Society regarding legislation

Legislative recess

April 16, Tuesday

Meeting with Brown medical students regarding Harm Reduction Center legislation

OHIC Health Insurance Advisory Committee

Legislative recess

April 17, Wednesday

Primary Care Physician Advisory Committee

Legislative recess

April 19, Friday

RIMS Notes issue production

Meeting with Chairman Miller regarding legislation

April 23, Tuesday

Legislative Hearings

April 24, Wednesday

Public hearing on pharmacy regulations at DOH

Legislative Hearings: Samuel Evans, MD

Legislative Hearings: Alyn Adrain, MD, AMA Delegate and Past President, and Helena Kuhn, MD, RIMS Councilor, representing dermatology, testified on separate bills.

April 25, Thursday

May is Mental Health Month Kickoff, State House

Legislative Hearings

Senator Valverde fundraiser

April 26, Friday

Meeting with Virgin Pulse: Newell E. Warde, RIMS Executive Director

April 29, Monday

International E-Cigarette Summit, Washington, DC; Steven R. DeToy, RIMS Director of Government and Public Affairs

RIMS Finance Committee: Catherine A. Cummings, MD, RIMS Treasurer

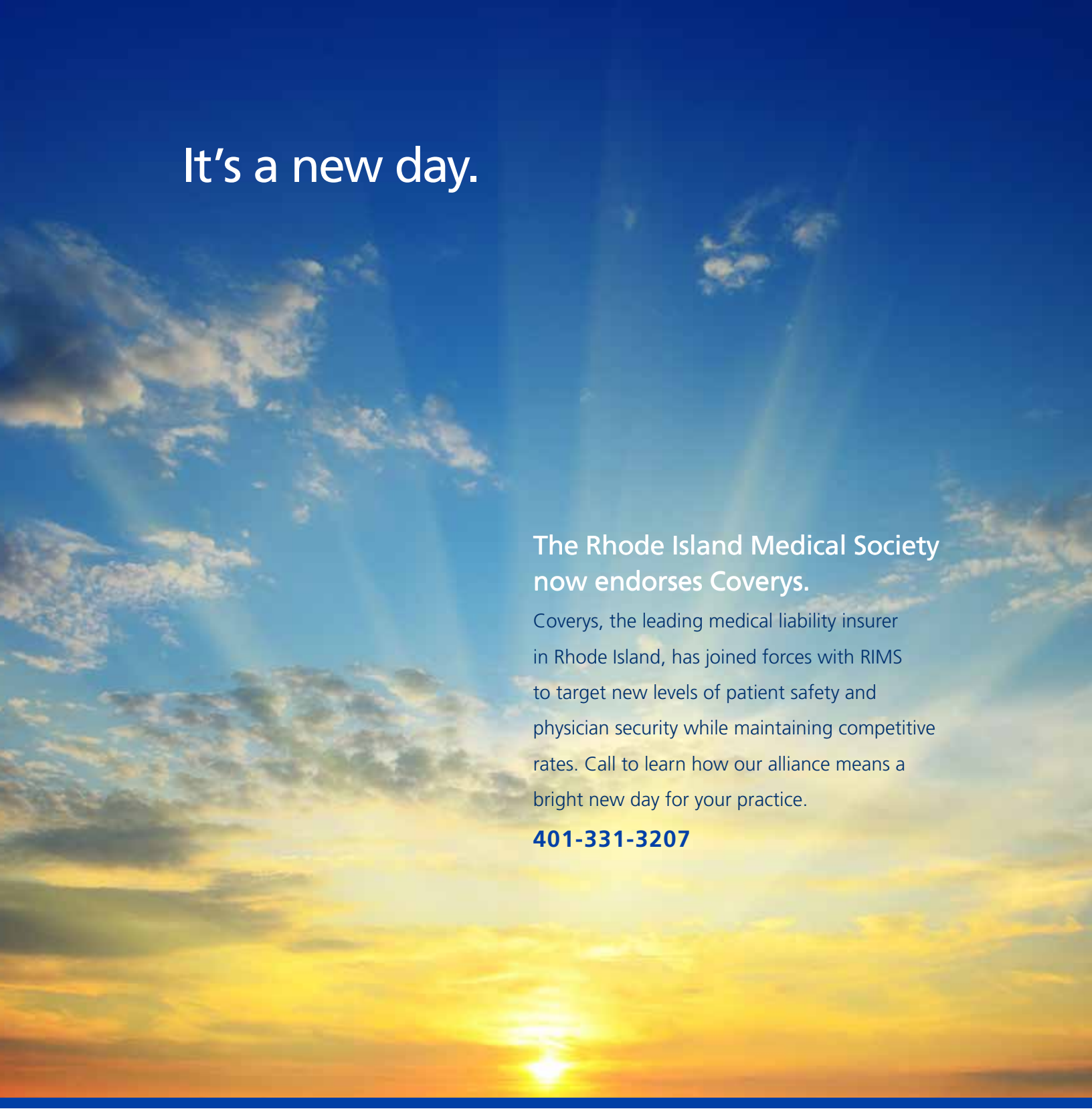
April 30, Tuesday

OHIC Integrated Behavioral Health Workgroup

Legislative Hearings

April 30–May 2, Tuesday–Thursday

Annual Meeting of Accreditation Council for Continuing Medical Education, Chicago: Maria Sullivan, Director, Office of Continuing Medical Education, Warren Alpert School of Medicine and member of RIMS CME Committee



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Contact Marc Bialek for more information: 401-331-3207 or mbialek@rimed.org

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Neighborhood Health Plan of Rhode Island is a non-profit HMO founded in 1993 in partnership with Rhode Island's Community Health Centers. Serving over 185,000 members, Neighborhood has doubled in membership, revenue and staff since November 2013. In January 2014, Neighborhood extended its service, benefits and value through the HealthSource RI health insurance exchange, serving 49% the RI exchange market. Neighborhood has been rated by National Committee for Quality Assurance (NCQA) as one of the Top 10 Medicaid health plans in America, every year since ratings began twelve years ago.

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Lifespan issues strong opposition to proposed CNE/Partners merger

Lifespan's board of directors and chief executive officer announced on April 24 that they strongly oppose the proposed acquisition of Care New England by Partners HealthCare.

Lifespan Chairman of the Board of Directors, **LAWRENCE AUBIN**, said, "Allowing such an acquisition to move forward would have devastating consequences for Rhode Island and its health care delivery system, now and for years to come," and lists as examples the following:

- Higher cost of health care for Rhode Islanders, based on the higher reimbursement rates commanded by Partners HealthCare and lack of regulatory oversight by the Rhode Island Office of the Health Insurance Commissioner (OHIC) on those rates
- Loss of ability to attract the best medical experts to Rhode Island due to loss of necessary patient volumes
- Negative impact on patients, who will have to travel out of the state for care they currently are able to receive here
- Vital health care jobs will be moved from Rhode Island to Boston
- Critical health care decisions that affect all Rhode Islanders will also move to Boston

"With the recent release of the Change of Effective Control [posted to the DOH website in March], we now know that Partners intends to make no investment in CNE – pay $0 for CNE and commit no capital investment, just a takeover of community assets that were built by Rhode Islanders for Rhode Islanders. Loss of Care New England, a community asset, and the decision to turn these assets over to Boston at zero cost is a travesty," Aubin adds.

A recent report commissioned by OHIC found that:

- Partners' Mass General and Brigham and Women's Hospitals are among the highest priced general acute care hospitals in Massachusetts;
- This proposed takeover already contributed to the closing of Memorial Hospital; and
- Partners physician organizations are up to 50 percent more expensive than Rhode Island commercial physician fee schedules.

TIMOTHY J. BABINEAU, MD, president and chief executive officer of Lifespan added, "It is essential that Rhode Island have a locally controlled academic medical center that can attract top specialists and primary care physicians working for the people of Rhode Island. The proposed acquisition places that at great risk."

Lifespan has developed a website to present its perspective to the public at www.ProtectRIHealthCare.org. ❖

Joint statement from Betsy Nabel, MD, president and CEO, Brigham Health, and James E. Fanale, MD, president and CEO, Care New England Health System

The following statement was released on April 24th :

"Brigham Health's proposed acquisition of Care New England will create a stronger health system for Rhode Islanders. Together, we'll deliver affordable and world-class care right here in Rhode Island. Our longtime affiliation at Kent Hospital proves we keep care local. Less than one percent of our patients are transferred to Brigham Health – and those are the sickest patients who require highly specialized care. The acquisition by Brigham Health would further CNE's recent financial turnaround and provide much-needed financial stability. We're exploring the potential for clinical expansion, including the development of new, lower-cost, community-based ambulatory care centers, which could create more clinical jobs and lead to the recruitment of specialty physicians offering an expanded array of clinical services in Rhode Island. We are working closely with the Rhode Island Department of Health and the Attorney General to ensure that this collaboration will strengthen the Rhode Island health care system for all." ❖

Statement from Brown University President Christina Paxson

"In the past, I have advocated for an integrated healthcare solution that brings Care New England and Lifespan together with Brown to create a unified academic medical center in Rhode Island. However, multiple previous attempts to realize this vision have failed. While I remain committed to the vision of a thriving academic medical center, it's uncertain that another attempt involving Lifespan and Care New England would be successful at present. Brigham's financial strength, its standing as a world-class medical center, and its stated commitment to locally-provided care offer an attractive alternative to a "local" solution. In the end, Rhode Island's Department of Health and Attorney General will have to decide what's in the best interest of Rhode islanders. Brown remains strongly dedicated to the goals of providing the highest quality healthcare and exceptional medical training, enhanced opportunities for research, and biomedical innovation that fuels economic development in Rhode Island." ❖

From left, **David DeMaso, MD**, psychiatrist-in-chief of Boston Children's Hospital and chairman of The Leon Eisenberg Chair in Psychiatry; **Henry Sachs, MD**, Vice President and Chief Medical Officer of Bradley Hospital; **Margaret M. Van Bree, MHA, DrPH**, president of Rhode Island Hospital and its pediatric division Hasbro Children's Hospital; **Kevin Churchwell, M**D, President and Chief Operating Officer of Boston Children's Hospital; **Sandra Fenwick, CEO**, of Boston Children's Hospital; and **Timothy J. Babineau, MD**, president and chief executive officer of Lifespan. [BILL MURPHY/LIFESPAN]

Boston Children's, Hasbro sign alliance agreement to broaden access to pediatric complex care

BOSTON AND PROVIDENCE, APRIL 12, 2019 – Boston Children's Hospital and Hasbro Children's Hospital have signed an agreement to identify areas of care for children and adolescents in which a formal collaboration will enhance the organizations' ability to ensure that each patient gets the right care in the right setting, with the goal of treating patients close to where they live whenever possible.

The agreement builds on the existing collaboration of both organizations' clinicians in treating patients with heart conditions and cancers by reinforcing those collaborations and identifying new areas of opportunity to improve care, including in fetal treatments and behavioral health. Relying on the talents and expertise of their clinicians, Hasbro Children's and Boston Children's will jointly develop protocols and pathways, especially for patients with rare and complex conditions. Hasbro Children's Hospital patients will benefit from a defined relationship with Boston Children's for stem cell transplantation; Boston Children's patients will benefit from work with Lifespan's Bradley Hospital, a psychiatric hospital for children. Because both hospitals have strong programs, they will share expertise and research and will provide consultation to advance pediatric care in the region.

"Hasbro Children's Hospital provides 95% of the inpatient care for pediatric patients in Rhode Island, with less than 1% of patients leaving the state for care. This collaboration is designed to keep patients local, continue to provide what the local community expects from Hasbro Children's, while cementing a relationship that will inspire further advances in pediatric care," said Rhode Island Hospital President **MARGARET M. VAN BREE, MHA, DRPH**."Together, our goal is to advance the scope and quality of care we deliver regionally and facilitate access to the innovations of another pediatric hospital."

"Boston Children's is committed to the best clinical and research-based care with the highest-quality patient outcomes," said **SANDRA L. FENWICK**, CEO of Boston Children's Hospital. "This agreement recognizes that great care should be provided as close to a patient's home as possible, which can be achieved only if we work with other excellent pediatric hospitals. Boston Children's and Hasbro Children's together have the determination and know-how to bring the best quality outcomes to patients efficiently. We aim to build on two strong records of success and deliver value to our patients through this collaboration." ❖

Rick Majzun, president and COO of W&I, resigns; Matt Quin, RN, MSN, named interim chief

RICK MAJZUN, FACHE, who was named president and chief operating officer of Women & Infants Hospital effective July 23, 2018, resigned from his position on April 8 immediately "to pursue other professional opportunities," according to a statement from Care New England.

Majzun came to Women & Infants from Barnes Jewish Hospital and St. Louis Children's Hospital in St. Louis, MO.

PHOTOS: CARE NEW ENGLAND

Rick Majzun

Matt Quin

"Care New England and Women & Infants would like to thank Rick for his efforts since arriving last fall and appreciate his support, energy, and enthusiasm for the important work taking place both at Women & Infants and across Care New England, and we wish him well in his future endeavors," CNE spokesperson **JIM BEARDSWORTH** said in a statement. "A search for a new president/COO is expected to commence in a few months."

MATT QUIN, RN, MSN, has been named interim chief operating officer. He joined Women & Infants in 2013 as vice president for nursing operations, and was named senior vice president of patient care services and chief nursing officer in 2015. Previously, Quin served in several roles at Brigham and Women's Hospital including the director of the Surgical, Burn and Trauma Intensive/Intermediate Care and director of Cardiac Surgical Intensive Care, where he led the units' clinical discipline of nursing.

A graduate of Saint Anselm College in Manchester, NH, Quin earned a master's of science in nursing at Simmons College. ❖

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Rhode Island receives failing grades for ozone pollution on Air Quality Report Card, finds 2019 'State of the Air'

PROVIDENCE (APRIL 24, 2019) – The American Lung Association's 2019 "State of the Air" report found all three reporting counties in Rhode Island received failing grades for ozone pollution this year, and all three also reported an increase of year round particle pollution. The annual air quality "report card" tracks Americans' exposure to unhealthful levels of ozone or particle pollution, both of which can be deadly.

"Rhode Island residents should be aware that we're breathing unhealthy air, driven by emissions from power plants and extreme heat as a result of climate change, placing our health and lives at risk," said **JENNIFER WALL**, Director of Advocacy for the American Lung Association in Rhode Island. "In addition to challenges here throughout Rhode Island, the 20th-anniversary 'State of the Air' report highlights that more than 4 in 10 Americans are living with unhealthy air, and we're heading in the wrong direction when it comes to protecting public health."

This year's report covers the most recent quality-assured data available collected by states, cities, counties, tribes and federal agencies in 2015–2017. Notably, those three years were the hottest recorded in global history.

Each year the "State of the Air" provides a report card on the two most widespread outdoor air pollutants, ozone pollution, also known as smog, and particle pollution, also called soot. The report analyzes particle pollution in two ways: through average annual particle pollution levels and short-term spikes in particle pollution. Both ozone and particle pollution are dangerous to public health and can increase the risk of premature death and other serious health effects such as lung cancer, asthma attacks, cardiovascular damage, and developmental and reproductive harm.

Ozone Pollution

Compared to the 2018 report, the counties of Kent and Providence recorded more bad air days for ozone, causing their 2018 D grades to drop to Fs. Washington County maintained a failing grade, but also experienced more bad ozone days that recorded in the previous report. All together, the three counties recorded a total of 41 bad "orange" and "red" ozone days from 2015–2017, compared to 29 from 2014–2016.

"Rhode Island has over 18,000 kids with pediatric asthma, over 91,000 adults with asthma, and over 55,000 adults with COPD. Ozone can be harmful to anyone, but these populations as especially at risk, often driving them to the doctor's office, the hospital or the emergency room," said Wall.

Debra Keating-Cole, a Providence resident with asthma and COPD, said, "Bad air days force me to stay inside, and can even keep me from walking my dog. I used to love sitting on the porch, but now if I step outside on the wrong day the humidity and pollution hits me like a ton of bricks."

This report documents how warmer temperatures brought by climate change make ozone more likely to form and harder to clean up. This year's report showed that ozone levels increased in most cities nationwide, in large part due to the record-breaking global heat experienced in the three years tracked in the report.

Particle Pollution

The 2019 report also found year-round particle pollution levels higher than the 2018 report in all three counties, which goes against the national trend showing progress reducing year-round levels of particle pollution. Providence measured a significant increase, from 7.6 µg/m3 in the 2018 report to 9.1 µg/m3 in this year's report.

"Particle pollution is made of soot or tiny particles that come from coal-fired power plants, diesel emissions, wildfires and wood-burning devices. These particles are so small that they can lodge deep in the lungs and trigger asthma attacks, heart attacks and strokes, and can even be lethal," said Wall. "It's concerning that our local year-round particle pollution levels have increased – and it's likely due to regional and local weather patterns as well as some weather events caused by climate change."

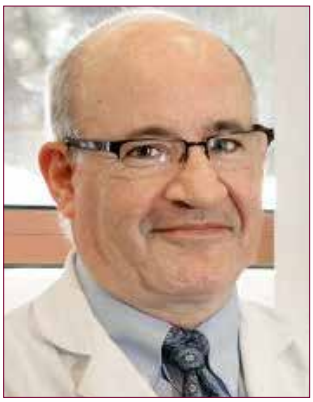
"State of the Air" 2019 also tracked short-term spikes in particle pollution, as these can be extremely dangerous and even lethal. The report found that Providence did have one fewer days when short-term particle pollution reached unhealthy levels, but it was not a significant enough difference to improve its 2018 B grade.

While the report examined data from 2015–2017, this 20th annual report online provides information on air pollution trends back to the first report. Learn more about Rhode Island's rankings, as well as air quality across the state and the nation, in the 2019 "State of the Air" report at Lung.org/sota. ❖

New England's first in-utero spina bifida surgery performed at Hasbro Children's Hospital

PROVIDENCE – Hasbro Children's Hospital and Women & Infants Hospital, through their joint Fetal Treatment Program of New England, have performed the first open fetal surgery of its kind in the Northeast – microscopic repair of a baby's spinal cord before birth.

A 15-member multidisciplinary team, including nine physicians and two teams of nurses and scrub technologists, came together at Hasbro Children's last May to perform the delicate two-hour surgery on the fetus, then at 25 weeks of gestation, and mother Emily Hess, of Attleboro, MA. It's critical the intervention be done by 26 weeks of gestation for the safety of mother and baby, with the goal of the mother carrying as close to term as possible. Emily's son, Selwyn, who had a severe defect on the lower level of his spine, was successfully delivered via C-section in late July at Women & Infants Hospital, just two days before a scheduled C-section.



Francois Luks, MD

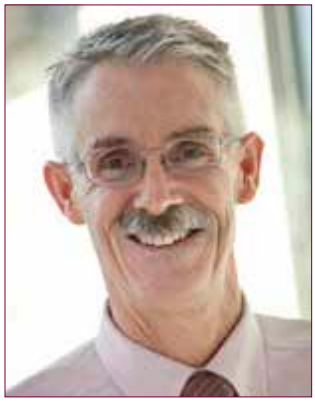
"It was a huge success. It was as if the team had been doing this for years, and it's heartwarming to see how well Selwyn is doing now. He's growing like an otherwise normal child, and that certainly bodes well for his future," said **FRANCOIS LUKS, MD, PhD**, pediatric surgeon-in-chief and division chief of pediatric surgery at Hasbro Children's.

Traditionally done after a baby is born, in-utero surgery for spina bifida requires specific criteria be met such as early diagnosis of the defect and health of the mother. Significantly more delicate than surgery after delivery, the in-utero surgery requires opening the uterus to allow access to the fetus. Once the fetus' back is exposed, pediatric neurosurgeons repair the defect, closing it in layers and covering it with skin and grafts so that leakage of spinal fluid is eliminated and the spinal cord is no longer exposed. The fetus is then repositioned within the uterus and the uterus is closed.

A 3-D model of the fetus was printed at Hasbro Children's a couple of weeks prior to surgery to illustrate the patient's spinal cord and defect, and the surgical team rehearsed in the Hasbro Children's operating room in advance.

Emily Hess and her son, Selwyn. [PHOTOS: LIFESPAN]

"With this incredible team with amazing talent and expertise in so many different areas, we are now able to perform work that used to have to be done after the baby was born. The earlier you can modify things, the better chance you have of effecting a really good outcome," said **STEPHEN CARR, MD**, director of the Prenatal Diagnosis Center at Women & Infants and co-director of the Fetal Treatment Program of New England.



Stephen Carr, MD

"When we learned that Selwyn had spina bifida, it was a blow, and very emotional, but he is doing very well. He's meeting most of his developmental milestones and kicking his legs all the way down to his toes," said mother Emily Hess. ❖

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Rhode Island Hospital, Teamsters Local 251 reach 5-year contract agreement

PROVIDENCE – Rhode Island Hospital and Teamsters Local 251 are pleased to have reached a five-year contract agreement, effective April 1, 2019 through March 31, 2024. Union membership overwhelmingly ratified the tentative agreement proposed to them on Thursday, April 11.

The agreement includes annual wage increases of 3 percent each year for a total of 15% over the five-year contract term. Effective April 2023, a minimum wage of $15 per hour for all positions will go into effect across the Lifespan system. The contract offers competitive health coverage benefits for full and part-time employees, along with retirement and earned time benefits for future employees that align with the overall Lifespan system benefits. It injects stability in the workforce by addressing transfers, leaves of absence and the use of per diem employees.

The negotiations process included dozens of hours at the table, with a high degree of professionalism and cooperation, and both parties are confident that this is a fair and sustainable agreement that reflects the value placed on the 2,500 Local 251-represented employees.

"After months of member-to-member organizing and surveying the needs of the members, the Teamsters Local 251 negotiating committee set out to satisfy key demands of the workers," said **MATTHEW TAIBI**, secretary treasurer and principal officer of Local 251. "This contract addresses the important issues of fair wage increases, a $15 minimum wage, Teamster healthcare benefits, retirement security, quality jobs that support families, and job security.

"The valuable employees represented by Local 251 comprise a broad cross-section of the Rhode Island Hospital workforce," said **MARGARET M. VAN BREE, MHA, DRPH**, president of Rhode Island Hospital. "Our CNAs, unit secretaries, environmental services, central transport, facilities, buildings and grounds, and other key personnel who are Local 251 members are the backbone of keeping the hospital functioning and friendly to all who pass through its doors. We are grateful for their work, and pleased to have agreed upon this smart and fair contract." ❖

Pictured are (L-R) **Timothy J. Babineau, MD**, Lifespan president and CEO; **Lisa Abbott**, Lifespan senior vice president of human resources and community affairs; **Gary DaSilva**, radiology tech assistant and Local 251 liaison; **Paul Santos**, Local 251 president and business agent; **Matt Taibi**, Local 251 secretary treasurer and principal officer; **Matthew Maini**, Local 251 business agent; **Margaret M. Van Bree, MHA, DrPH**, Rhode Island Hospital president; **Tony Suazo**, receiving clerk and Local 251 vice president/RIH steward; **Bill Schmiedeknecht**, Lifespan vice president for business partnerships & labor relations. [PHOTO: LIFESPAN]

Community Physician Partners signs on to statewide Choosing Wisely campaign to improve dialogue between physicians and patients

PROVIDENCE – Lifespan partner Community Physician Partners (CPP), an independent association of primary care physicians, has signed on to the Choosing Wisely campaign, a nationwide initiative to promote conversations between patients and clinicians aimed at avoiding unnecessary medical tests and procedures.

CPP's move to sign an agreement with Choosing Wisely RI means that the more than 170 primary care physicians in the partnership, which is part of the Lifespan Health Alliance, will be embracing the tenets of the campaign in caring for their more than 100,000 patients across Rhode Island.

"The Choosing Wisely campaign is a great and long overdue conversation starter between patients and their doctors," said **DAVID MARCOUX, MD**, president of CPP. "Patients seek and deserve good care and doctors want to deliver nothing less. Doctors want to order the right test or treatment at the right time and avoid what has limited to no value. This is an excellent program. We're all in."

The campaign cites a National Academy of Medicine statistic that an estimated $765 billion per year is spent on unnecessary or needlessly expensive care and that 30,000 deaths per year are attributable to overly aggressive treatment. Surveys by ABIM have found that physicians feel pressured by patients to prescribe unnecessary tests or treatments for fear of lawsuits and losing patients. The surveys also indicate that physicians lack the tools to have better conversations with patients and that patients feel uncomfortable asking their doctors questions. The national campaign was launched in 2012.

The campaign is supported by a variety of literature, videos and phone apps, including a list of "5 Questions to Ask Your Doctor Before You Get Any Test, Treatment or Procedure."

Choosing Wisely is a national campaign of the ABIM (American Board of Internal Medicine) Foundation that was launched in Rhode Island by the Rhode Island Business Group on Health, a non-profit group that advocates for affordable, high-quality health care. Other supporters include the Rhode Island Foundation, the Rhode Island Department of Health and the Rhode Island Medical Society.

CPP is a not-for-profit physician-governed association whose members are part of the Lifespan Health Alliance, an accountable care organization (ACO) that strives to deliver high-quality, high-value care in a patient-centered medical home. In CPP, patients and providers are true partners in care decisions. CPP also maintains a network of highly talented specialists to provide integrated care that is efficient and affordable. ❖

Dr. Kenneth Allen publishes evidence of impulsive behavior in nonsuicidal self-injury

Outcome suggests promising treatment target for some at high-risk for suicide

Are young adults who harm themselves more at risk for suicide? New research suggests there could be a connection under specific conditions associated with negative emotions.

KENNETH J.D. ALLEN, PhD, a postdoctoral research fellow in the Psychosocial Research Program at Butler Hospital and the Department of Psychiatry and Human Behavior at The Warren Alpert Medical School of Brown University, recently published several articles related to this important topic. His research suggests that nonsuicidal injury (NSSI), when people harm themselves without wanting to die, is associated with impulsive behavior, but only under specific conditions associated with negative emotions. Importantly, this research also identifies potential areas of treatment for a select group of individuals deemed as high-risk for suicide attempts.

Dr. Allen's work was published in the peer-reviewed scientific journals Psychiatry Research (Frequency of nonsuicidal self-injury is associated with impulsive decision-making during criticism) and Behavior Therapy (Negative Emotional Action Termination (NEAT): Support for a cognitive mechanism underlying negative urgency in nonsuicidal self-injury). Dr. Allen's work was completed with the support of his PhD advisor **JILL M. HOOLEY, DPhil**, who is affiliated with the Department of Psychology at Harvard University, and **HEATHER T. SCHATTEN, PhD**, his co-mentor at Brown and Butler.

"People who self-injure, both more frequently and more recently, also make more impulsive choices when experiencing distress than those who self-injure less frequently and/or less recently," said Dr. Allen. "Importantly, this suggests the response to actual, perceived, or even self-criticism may be a promising treatment target, particularly for those at highest risk of future suicide attempts."

Common examples of NSSI include cutting, burning, or hitting oneself. NSSI is common, especially among adolescents and young adults, even those without any diagnosable psychiatric conditions. While NSSI occurs without the intent of suicide, it is also one of the strongest predictors of future attempted suicide, so determining shared and distinct factors involved in nonsuicidal and suicidal forms of self-injury is critical.

Dr. Allen explained that while NSSI without suicidal intent may be a common behavior, the potential for serious consequences is significant, as research suggests these events are equivalent to prior suicide attempts in predicting future suicidal behavior.

"The clinical implications of this research could be substantial," said Dr. Allen. "When and where the NSSI occurs in conjunction with negative mood and accompanying impulse control problems might inform assessment, treatment, and prevention of both NSSI and suicide, which is really what we're here for."

The published research shows the results of new laboratory tasks created by Dr. Allen and his colleagues addressing the discrepancy between self-reported impulsivity in people who engage in NSSI and their lack of impulsive behavior on existing laboratory tasks. The impact of this indicates that NSSI is associated with impulsive behavior, but only under specific conditions associated with negative emotions.

Although previous studies did not identify impulse control deficits in NSSI, Dr. Allen's research demonstrates that people who self-injure have more difficulty controlling impulses directly motivated by negative emotions such as anxiety, anger, and sadness. Dr. Allen's studies suggest that difficulty controlling impulses motivated by distress might help explain the link between NSSI and future suicide.

This impairment is specific to negative emotional action termination, or the final stage of response inhibition, meaning that such individuals might only act impulsively once their negative feelings reach a certain level of intensity.

"Therapeutic interventions focusing on increasing 'mindfulness' could be particularly useful in helping individuals become aware of their emotions and accompanying urges before they become overwhelming and reach this breaking point," said Dr. Allen. "Ultimately, our findings suggest that once someone gives in to an impulsive urge to self-injure, they may find it especially difficult to stop, whereas if that person can catch this urge early on, they may be able to choose a more adaptive strategy to reduce their unpleasant emotional state, such as exercising or listening to music." ❖

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Appointments

Care New England introduces Physician Leadership Academy

In April Care New England (CNE) kicked off a new Physician Leadership Academy intended to enhance physician leadership development within CNE through a program focused on the most common and complex issues facing the health care industry.

The inaugural class is comprised of the following 12 physicians from across CNE: **KEVIN BAILL, MD** (Butler Hospital); **ADAM CZYNSKI, DO** (Women & Infants Hospital); **ANA FULTON, MD** (Care New England); **CHRIS FUREY, MD** (Kent Hospital); **JOHN GELZHISER, MD** (Kent Hospital); **AMY HALT, MD** (Butler Hospital); **ERICA HARDY, MD** (Women & Infants Hospital); **MELISSA MURPHY, MD** (Kent Hospital); **NAVEED RANA, MD** (Kent Hospital); **ROXANNE VREES, MD** (Women & Infants Hospital); **ERIKA WERNER, MD** (Women & Infants Hospital); and **JOANN WILKINSON, MD** (Kent Hospital).

The Physician Leadership Academy program directors are **JAMES E. FANALE, MD**, president and chief executive officer, CNE; **CHESTER HEDGEPETH, III, MD, PhD**, executive chief of cardiology, CNE; **MAUREEN PHIPPS, MD**, executive chief of obstetrics and gynecology, CNE, and chair, Department of Obstetrics and Gynecology, Brown University; and **RAYMOND POWRIE, MD**, executive chief of medicine, CNE.

"CNE is excited to be offering such an important training and development program for our physicians," said Dr. Fanale. "Further investing in physician leaders will only serve to strengthen our system as a whole while creating a foundation of leadership for the future."

The 12-month leadership academy curriculum includes implementing quality improvement initiatives while focusing on containing cost, changing payer relationships, the influence of accountable care organizations on population health and health care financing, bundled payment initiatives, Medicare and Medicaid finance, market consolidation, disparities in health outcomes, and funding for medical education and research.

Pictured left to right are **Amy Halt, MD** (Butler Hospital); **Naveed Rana, MD** (Kent Hospital); **Ana Tuya Fulton, MD** (Care New England); **Kevin Baill, MD** (Butler Hospital); **Erica Hardy, MD** (Women & Infants Hospital); **John Gelzhiser, MD** (Kent Hospital); **Melissa Murphy, MD** (Kent Hospital); **Chris Furey, MD** (Kent Hospital). [PHOTO: CNE]
Not pictured: **Adam Czynski, DO** (Women & Infants Hospital); **Roxanne Vrees, MD** (Women & Infants Hospital); **Erika Werner, MD** (Women & Infants Hospital); **JoAnn Wilkinson, MD** (Kent Hospital).

Regional and national health care experts will participate as guest faculty presenters, while members of CNE's executive leadership team will also serve as session presenters. CNE's access to industry experts, combined with its clinical depth and rich array of nationally and regionally recognized clinicians, ensure academy participants are receiving the best possible training, while maintaining minimal costs to implement this educational opportunity.

In addition to the curriculum work, participants will be expected to participate in a significant team-based project currently underway or in development at CNE. Each participant will also be assigned an executive-level advisor who will work with them throughout the duration of the program.

"At the culmination of this enriching and educational opportunity, participants will be expected to have gained a greater level of insight into their personal leadership approach, better understand health care finance and funding mechanisms, have deeper knowledge of population health management and accountable care organizations, and understand aspects of hospital and medical group operations, among other health care-related expertise," said Dr. Fanale. "This program is expected to help CNE develop emerging leaders and plan for continuity across leadership roles throughout CNE." ❖

Appointments

Jeffrey Gaines, MD, named chief medical officer at Newport Hospital

Newport Hospital has appointed **JEFFREY GAINES, MD**, a veteran of the hospital's emergency department, to serve as vice president of medical affairs and chief medical officer, effective July 1.

Hospital President Crista F. Durand announced on Tuesday, April 16 that Gaines will succeed **THOMAS M. McGUE, MD**, who served as the chief medical officer from 2013 until January 2019.

"After a national search, Dr. Gaines emerged as the top talent to help champion our mission and move our quality platform forward," said Durand. "His energy, vision and leadership skills, combined with his thorough understanding of the culture of Newport Hospital, make him an ideal choice. His years of clinical experience in emergency medicine; his dedication and empathy; and his service in numerous leadership roles throughout the hospital will prove a significant benefit for patients and staff alike. I'm delighted to welcome him to this new role."

Gaines has worked in a full-time clinical role in the emergency department of Newport Hospital for the past 10 years. He served as medical staff president from 2016 to 2017.

"I am deeply honored to become part of Newport Hospital's rich history," Gaines said. "I'm passionate about upholding the hospital's tradition of excellence while bringing innovative ideas to fruition. I welcome the opportunity to both serve, and lead, the hospital with the entire senior leadership team."

Gaines is a clinical assistant professor in the emergency medicine department of The Warren Alpert Medical School at Brown University.

Gaines graduated from Wayne State University cum laude with honors and earned his medical degree from the University of Michigan Medical School. He completed his residency in emergency medicine at University of Pittsburgh Affiliated, where he was named chief resident, and is a fellow of the American College of Emergency Physicians. He serves on the staff of Brown Emergency Physicians.

Gaines is currently working toward a master's degree in health care management at Harvard University.

Gaines lives in Barrington with his wife, Sarah, an emergency medicine physician at The Miriam Hospital and Rhode Island Hospital. They have two daughters. ❖

Prabjot Channa, MD; Andrew Young, MD, MPH, join LPG Ophthalmology

Lifespan Physician Group Ophthalmology (LPG) recently welcomed two new physicians to its team.

PRABOT CHANNA, MD, an Associate Professor of Surgery, Clinician Educator at the Alpert Medical School of Brown University, is the Director of the Cornea Service at Rhode Island Hospital. Her areas of expertise include cornea and external disease and cataract surgery.

Dr. Channa, a board-certified ophthalmologist, received her MBBS from Goa Medical College, Goa, India and completed her ophthalmology residency there. She completed her fellowship in Cornea and External Disease at the Arvind Eye Hospital. She then completed a Cornea, External Disease, and Uveitis fellowship at the Francis Proctor Foundation at the University of California, San Francisco and residency in Ophthalmology at Bronx Lebanon Hospital, Albert Einstein School of Medicine in New York. Before moving to Providence, she was Associate Professor of Clinical Ophthalmology at the Montefiore Medical Center in New York.

ANDREW YOUNG, MD, MPH, provides primary eye care and diagnoses and treats common eye conditions. His areas of expertise include the medical and laser treatment of glaucoma. He is a Clinical Assistant Professor at the Alpert Medical School of Brown University.

A board-certified ophthalmologist, he received his undergraduate and medical degrees from the Alpert Medical School of Brown University's PLME program. He completed his internship in internal medicine at Rhode Island Hospital and his ophthalmology residency at Mount Sinai School of Medicine in New York. He subsequently completed his fellowship in glaucoma at the University of California, San Diego. He received his MPH in Community Health Sciences from the University of California, Los Angeles. Prior to returning to Providence, he was Assistant Clinical Professor at the David Geffen School of Medicine at UCLA. Dr. Young speaks Spanish and German. ❖

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[1] www.cdc.gov/tobacco/data_statistics/fact_sheets/cessation/quitting/index.htm

Recognition

Sharon Rounds, MD, to receive ATS Foundation 2019 Breathing for Life Award

PHOTO: ATS FOUNDATION

SHARON ROUNDS, MD, will receive the 2019 Breathing for Life Award – the highest honor given to an American Thoracic Society (ATS) member for philanthropy – during the Eleventh Annual ATS Foundation Research Program Benefit on Saturday, May 18, which will follow the Opening Ceremony at ATS 2019, Dallas, Texas.

As ATS president in 2004–2005, Dr. Rounds championed the formation of the ATS Foundation. Since then, the Foundation has given donors the confidence that one hundred percent of all donations for research support the ATS Foundation Research Program. In addition to being one of the most generous supporters of the Foundation, she served on the Foundation's board from 2012 until 2018.

A distinguished researcher on the pulmonary circulation, Dr. Rounds has supported the Foundation's efforts to advance the careers of promising young investigators in other ways. She chaired the ATS committee that selects grant recipients. Then, she told an interviewer, "We could double the number of grant recipients and not lose one iota of the quality of the research we fund."

At Brown University, Dr. Rounds is a professor of medicine and of pathology and laboratory medicine and associate dean for clinical affairs. From 2006–2015, she was chief of the medical service at the Providence VA Medical Center. As an educator, she has been recognized more than a dozen times for her excellence in teaching and mentorship, including receiving the Elizabeth A. Rich, MD, Award from the ATS.

Throughout her career, she has pressed for more opportunities for women and minorities in the fields of pulmonary, critical care, and sleep medicine, both at Brown and the ATS. Along with Alvin Thomas, MD, and Estelle Gauda, MD, she created the ATS Minority Trainee Development Scholarships program two decades ago. At Brown, for many years she was the principal investigator of an NIH-funded program to increase diversity in health-related research.

"This is the history of the United States of America: we're only as good as our diversity," she says. "It makes us better health care professionals, and it makes our research more relevant to the needs of the community."

QING LU, DVM, PhD, began working with Dr. Rounds as a post-doc 16 years ago and is now associate professor at Brown funded by a National Institutes of Health RO1 Grant. "Sharon wants other people to be successful," says Dr. Lu. "Without her support and confidence in me, I wouldn't be in academic medicine today."

ELIZABETH HARRINGTON, PhD, considers Dr. Rounds a pioneer. Sharon was among the few women "to do many things during her career in a very male dominated field," says Dr. Harrington, who is co-director with Dr. Rounds of the CardioPulmonary Vascular Biology Center for Biomedical Research Excellence, an NIH-funded effort to build vascular biology expertise in Rhode Island. "She is an excellent researcher and selfless mentor whose successes are an inspiration to many others following in her footsteps."

At a time of life when many consider retiring, Dr. Rounds remains active as a mentor, researcher, and clinician. She also remains active in the ATS.

Her long involvement with the ATS has its origins in her first presentation at the International Conference, given "on the afternoon of the last day," when her mentor, the legendary head of Denver's pulmonary and critical care program, Tom Petty, took a seat in the middle of the front row right before she began to talk. "It was a life-changing experience," she recalls.

One might think that her many committee assignments and leadership roles within ATS are a way of paying the Society back for helping to launch her career. But Dr. Rounds, characteristically, offers a humbler explanation.

"I view my time contribution to ATS, not as work, but as fun," she says. "The ATS is interesting and engaging and keeps my mind off things that I might find boring." ❖

Recognition

Megan L. Ranney, MD, named 2019 Woman Physician of the Year

The Rhode Island Medical Women's Association (RIMWA) will honor **MEGAN L. RANNEY, MD, MPH, FACEP**, as Woman Physician of the Year on May 21 at its annual meeting. This award is given annually to a Rhode Island female physician who excels in both her field of medicine and her dedication to the betterment of our community.

Ranney obtained her undergraduate degree at Harvard College and received her medical degree from Columbia University College of Physicians and Surgeons in New York, NY. Her residency training in Emergency Medicine was at Brown University in Providence, RI, where she was Chief Resident. Along with her residency training, Ranney pursued an Injury Prevention Research Fellowship and a Masters in Public Health, both at Brown University.

In addition to being a practicing emergency physician, Ranney is nationally known for her research and advocacy in the field of gun safety. She is Chief Researcher and Co-Founder of The American Foundation for Firearm Injury Reduction in Medicine (AFFIRM), comprised of healthcare professionals and researchers working together to curb the epidemic of firearm violence across the United States. She was appointed by Governor Gina Raimondo to Co-chair the Governor's Gun Safety Work Group and is the Rhode Island Representative to a multi-state Governors' Work Group on Firearm Injury Research.

Ranney's awards and accolades include the "Dean's Teaching Excellence Award," Alpert Medical School, Brown University; "Forty Under Forty in Rhode Island" award, Providence Business News; the "Bruce Selya Research Award," Lifespan Health System, and the "Technology Innovation Award," University Emergency Medicine Foundation, Providence.

The event will be held at the Marriott Providence Downtown, One Orms Street, on Tuesday, May 21, at 6 pm. It is open to both the medical and non-medical communities. To reserve a seat, contact Marc Bialek, mbialek@rimed.org or 401-331-1337. Information may also be found at www.rimedicalsociety.org/rhode-island-medical-women-s-association.html. ❖

Keith Hovan, chief executive officer for Southcoast Health, congratulates Baby Friendly taskforce, Charlton Memorial Hospital's family-centered unit nurses and staff, Fall River community partner, WIC, and lactation specialist at Charlton Memorial Hospital for receiving recognition as a designated Baby-Friendly birth facility by Baby-Friendly USA, Inc.

Charlton recognized as Baby-Friendly Birth Facility by Baby-Friendly USA, Inc.

FALL RIVER – Charlton Memorial Hospital has received recognition as a designated Baby-Friendly birth facility by Baby-Friendly USA, Inc.

This designation makes Southcoast Health an entirely Baby Friendly system. Tobey Hospital received Baby Friendly designation in 2011 and St. Luke's Hospital in 2018.

"Baby Friendly designation is a very special accomplishment that we are all very proud of for many reasons. It is a special designation, first and foremost, as it is the very best way to treat, educate, and support our families," said Jennifer Bloom, nurse manager of the family centered unit at Charlton Memorial Hospital. "Baby Friendly USA practices at Southcoast ensure that moms and babies receive the best possible care and promotes their best possible health."

Baby Friendly USA designation facilities offer breast feeding education before, during and after child birth. Designated facilities promote and practice policies such as optimal early bonding care via skin to skin contact with mother and baby immediately after childbirth and keeping babies in room to help prepare parents for going home.

"This was a five-year journey for our unit. There were a lot of practice changes and change is always difficult at first," said Terri Martin, RN, lactation consultant at Charlton Memorial's family-centered unit. "The nurses on this unit were really the backbone of our success in obtaining this accreditation. Their dedication to provide continued support to our families was evident during this process."

Baby-Friendly USA, Inc is the U.S. authority for the implementation of the Baby-Friendly Hospital Initiative ("BFHI"), a global program sponsored by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF). The initiative encourages and recognizes hospitals and birthing centers that offer an optimal level of care for breastfeeding mothers and their babies. ❖

Appointments

Jennifer Anderson, Certified Nurse Midwife, joins Southcoast Health Obstetrics & Gynecology

NEW BEDFORD – Southcoast Physicians Group welcomes **JENNIFER ANDERSON**, Certified Nurse Midwife to Southcoast Health Obstetrics & Gynecology.

Jennifer Anderson earned a Bachelor of Science degree in Nursing and a Master of Science degree, specializing in Midwifery, from the Columbia University School of Nursing in New York, N.Y. She has been a practicing Certified Nurse Midwife since 2007. Jennifer has experience caring for women with uncomplicated and high-risk pregnancies, as well as providing routine gynecologic and family planning services.

Jennifer is a member the American College of Nurse Midwives. Her clinical interests include the role of nutrition in health and disease, substance use disorders, and improving postpartum care and support for women and families. ❖

Recognition

Kent Hospital Rehabilitation Program and Laboratory achieve accreditation

Kent Hospital has recently earned accreditation from the Commission on Accreditation of Rehabilitation Facilities (CARF), the College of American Pathologists (CAP), and AABB (formerly known as the American Association of Blood Banks). Each accreditation followed a rigorous survey and assessment.

The Rehabilitation Center at Kent has received CARF accreditation based on a survey of the hospital's adult rehabilitation program, amputation specialty program, and stroke specialty program.

The Kent Hospital Department of Pathology & Laboratory Medicine has been accredited by the CAP Laboratory Accreditation Program, which the federal government recognizes as being equal to or more stringent than the government's own inspection program. During the CAP accreditation process, designed to ensure the highest standard of care for all laboratory patients, inspectors examine the laboratory's records, standard operating procedures and quality control of procedures for the preceding two years. CAP inspectors also examine laboratory staff qualifications, equipment, facilities, safety program and record, and overall management.

The department has also been granted AABB accreditation for its transfusion service. Accreditation for AABB follows an intensive onsite assessment by specially trained AABB assessors and establishes that the level of technical and administrative performance within the facility meets or exceeds standards set by AABB. ❖

Obituary

NAEEM MUHAMMAD SIDDIQI, MD, a urologist, refined poet, proud Rhode Islander, and lover of all things family, died on April 6, 2019, at the age of 84, surrounded by loved ones, after a courageous battle with lung cancer.

One of nine children, he was born in Lucknow, India, the son of Hakim and Hasina Siddiqi.

Dr. Siddiqi graduated from Aligarh Muslim University in India, and King Edward Medical College in Pakistan. After graduation it was his dream to train and practice in the United States. Through his characteristic hustle, he secured an internship at Lowell General Hospital and moved to the U.S. in 1959. Recognition of his intellect and unrivalled work ethic landed him a urology residency at Beth Israel Deaconess Medical Center in Boston. He then served in multiple academic positions including as a teaching fellow at Harvard Medical School and as a research fellow at Roger Williams Hospital.

In 1968, he married Nishat T. Siddiqi, and moved to Montreal to complete a MSc in Experimental Surgery at McGill University. He eventually settled in Cumberland, Rhode Island, where he worked at Landmark Medical Center in Woonsocket for nearly 30 years, holding the positions of Chairman of the Department of Surgery and Chief of Urology on two separate occasions. He was also a Clinical Instructor of Surgery at Brown University.

In retirement, he was a voracious reader, frequent blogger, and avid Facebook poster. He loved anything that challenged him, taking up the clarinet and painting late in life and achieving success in both. He loved dining with friends and family, philosophizing about humanity, and reminding all that "life is good." His most cherished role of all was that of grandfather to his two grandchildren. His favorite times were the one dedicated week each summer spent with his immediate family in beautiful locations throughout New England, always his treat. His generosity knew no bounds, having sponsored the education of numerous students throughout the world.

In addition to his wife of 51 years, Dr. Siddiqi is survived by eldest son Faraaz Siddiqi of Los Angeles, CA, youngest son Dr. Omar Siddiqi and his wife Elizabeth McCarthy, two grandchildren, Akayla Siddiqi and Zain Siddiqi, all living in Lusaka, Zambia.

Those who wish to make a gift in his memory can donate to his son Omar's nonprofit organization providing neurological care in Zambia at neurologyz.com. ❖

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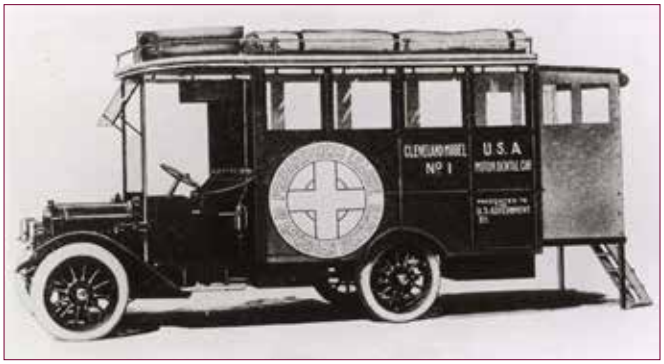
Vintage Ambulances: From horse-drawn to airborne

A U.S. Army horse-drawn ambulance with two servicemen. [NATIONAL LIBRARY OF MEDICINE]

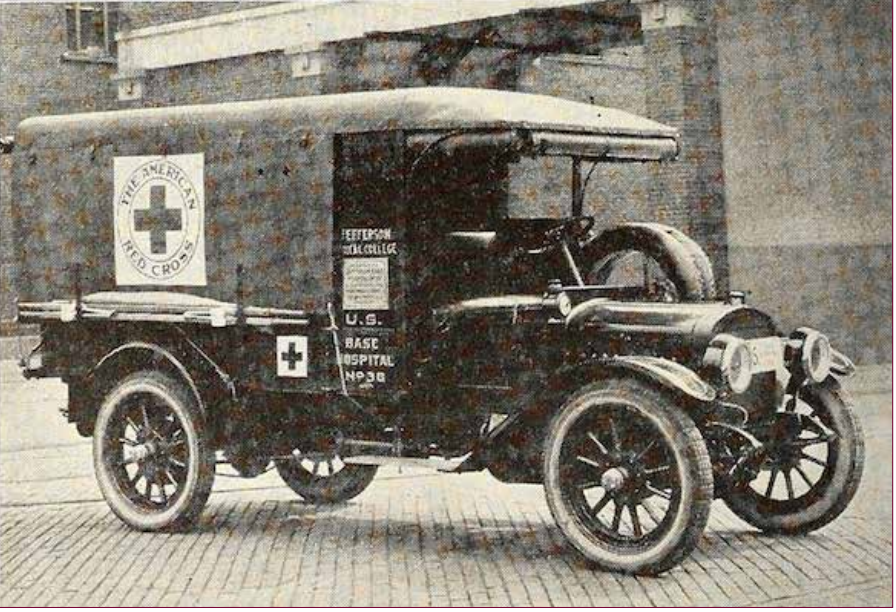
1861 photograph shows the Ambulance Corps demonstrating how they work together to remove wounded Civil War soldiers from the field. [LIBRARY OF CONGRESS PHOTO]

An ambulance train "parked" at Harewood Hospital, Washington D.C., 1863, just prior to the Battle of Gettysburg. [NATIONAL LIBRARY OF MEDICINE]



An ambulance with the Preparedness League of American Dentists emblem on the side in 1918, from the publication Dental Digest. [NATIONAL LIBRARY OF MEDICINE]

The 1st R.I. Ambulance Company during a mobilization parade in 1917. Spectators are seen lining both sides of the street. [PROVIDENCE PUBLIC LIBRARY DIGITAL COLLECTION]



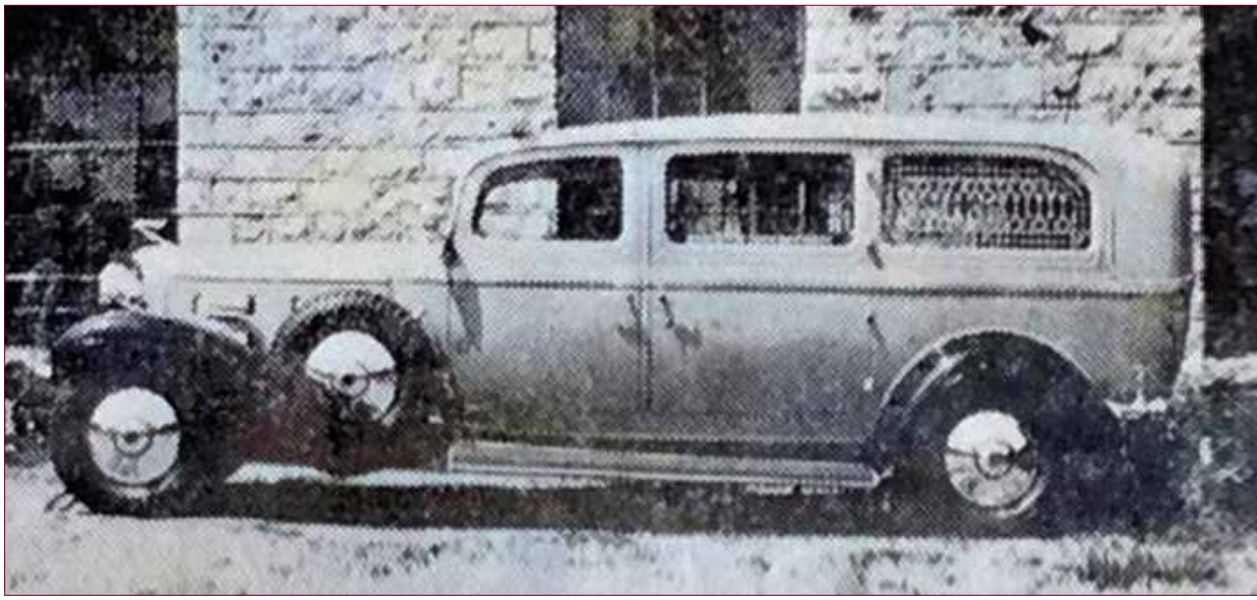
Red Cross ambulance presented by railway employees. [SMITHSONIAN LIBRARIES, ELECTRIC RAILWAY JOURNAL. v.58 JULY-DEC. 1921, (NEW YORK): MCGRAW HILL PUB. CO.]

Ford Model T Ambulance on display in the Early Years Gallery at the National Museum of the United States Air Force. [U.S. AIR FORCE PHOTO]

De Havilland DH-4 1920 ambulance. [U.S. AIR FORCE PHOTO]

Fokker A-2 ambulance. [U.S. AIR FORCE PHOTO]

Dr. Frank I. Payne



A 1936 Cadillac ambulance used by the Westerly Ambulance Corps, one of the oldest volunteer private emergency medical services established in 1917 under the name Westerly Red Cross Sanitary Unit. Dr. Frank I. Payne served as the Corps' founding father and first Commander. [THE WESTERLY AMBULANCE CORPS, INC.]